

Running head: ISKO NI JUAN MOBILE APPLICATION

**ISKO NI JUAN: MOBILIZING SMALL-SCALE PHILANTHROPY TO
FINANCE COLLEGE STUDENTS USING MACHINE LEARNING**

A Thesis
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Computer Studies Department
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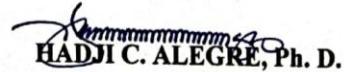

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ABSTRACT

In today's rapidly evolving educational landscape, accessing adequate funding for tertiary education has become increasingly challenging due to various factors, such as limited resources, intensifying competition, and stringent eligibility criteria imposed by traditional funding sources. Recognizing the need for alternative solutions, this study focused on leveraging the power of crowdfunding as a viable option for students to acquire financial aid. The general objective of the study is geared towards the development of a mobile application that utilized a machine learning algorithm, specifically the content-based recommendation algorithm, to mobilize small-scale philanthropy for financing college students. The mobile application, called "Isko ni Juan," served as a crowdfunding platform that connected small-scale philanthropists and tertiary level students in need of financial assistance. The study employed a mixed-methods approach, qualitative data were gathered through interviews with crowdfunding stakeholders, and a survey to gather data and insights on the current state of student financing in the Philippines. The researchers then developed the mobile application's architecture and features, including the machine learning algorithm for campaign recommendations. Throughout the project development, the researchers followed the Agile methodology. While in testing, Usability and Security testing were performed then the project was evaluated by students, small-scale philanthropists, and developers. The result showed that the mobile application was usable and secure, obtaining a grand weighted mean of 3.74 or "Highly Acceptable" rating from one hundred ten (110) respondents. Similarly, the machine learning algorithm proved to be effective in recommending campaigns, obtaining a grand weighted mean of 3.65 or "Highly Acceptable" rating from sixty (60) respondents. Overall, this study provided a proof of concept for a machine learning-powered mobile application that could make a significant impact on tertiary students' financial needs in the Philippines.

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- The Researchers

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Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

Education plays a crucial role in people's lives as it allows them to reach their highest potential (Leverage Edu, 2022). The importance of education is that it enables everyone to develop a positive outlook on the world and the society. It is the key to future success and paves the way for many opportunities in one's life. Education holds a significant position as one of the utmost priorities for Filipino parents when it comes to nurturing their children. They believe that having a better education will open doors to a better future and eventually help them overcome poverty (Maligalig et al., 2010). Consequently, they are willing to make significant sacrifices to send their children to school (LaRocque, 2004). Nevertheless, in the face of severe financial constraints within a family, essentials such as food and shelter tend to take precedence over education, thereby reducing the family's prospects of breaking free from poverty. Consequently, ensuring equitable access to education becomes paramount for the underprivileged.

Talented students should not be denied opportunities for higher education and professional growth solely because of their financial circumstances. To encourage higher education, the government has implemented various initiatives, including scholarships for students from low-income families. However, while scholarships have assisted students in financing their education, obtaining one can be challenging due to a lack of transparency, missed deadlines, and other application-related issues. Furthermore, since most scholarships are provided by large organizations, there are philanthropists who are willing

to assist students, regardless of whether they have a scholarship. Small-scale philanthropists can give whatever they can give, whether it is money or school supplies, as long as it is based on the needs of the student. These philanthropists can be individuals or an organization seeking to find students that they can help. Scholarships have assisted students in funding their educational expenses.

While the involvement of small-scale philanthropists is beneficial in assisting students with their educational expenses, there are several limitations to this approach. Firstly, the availability of small-scale philanthropists may be limited compared to large organizations offering scholarships, which can restrict their capacity to support a significant number of students. Additionally, the decentralized nature of finding and connecting with individual philanthropists or organizations can make it challenging for students to locate and secure assistance.

To address this issue, crowdfunding has emerged as an alternative means of obtaining financial assistance. It is an internet-based platform that provides financial support to those in need, and with the growth of internet technology, crowdfunding platforms have evolved into a new form of network funding. However, the increase in crowdfunding projects has led to the “information overload” phenomenon, making it challenging for donors to discover suitable projects quickly. A machine learning algorithm can solve this problem by mining significant amounts of data to determine consumers’ interests and preferences, allowing for the creation of a recommendation system based on a content-based recommendation system using mobileBERT, which has proven successful in various fields, including crowdfunding (Lin et al., 2021).

Background of the Study

Scholarships are available in the Philippines from a variety of organizations and agencies. Scholarship programs in the Philippines come in many forms. According to Zabala and Gutierrez (2017), the most popular among college students is the Entrance Scholarship, which exempts successful applicants from paying tuition for a semester or a year. “Iskolar ng Bayan” refers to students who have passed the entrance examination for State Colleges and Universities. The government either fully or partially subsidizes tuition at these institutions. The Grant-in-aid Scholarship is another type of scholarship which is available to students who come from low-income families but perform well in academic subjects. However, with many Filipino students graduating and preparing to advance to a higher level of education, the application procedure of applying for a scholarship is rigorous, and the program compliance is quite demanding.

The problem is that scholarship benefits are limited, and only a few slots are available. As a result, only a small number of students are able to benefit, while the rest are unable to pursue higher education due to a lack of financial support. In other words, not all students are eligible for scholarships, which limits their access to opportunities. Furthermore, several difficulties are associated with the scholarship application process. Given the high academic standards required for scholarships, it is challenging for many students to be eligible and obtain assistance. Additionally, once a scholarship is awarded, strict academic requirements must be met in order to retain it; otherwise, it will be revoked. Moreover, there is no guarantee that the scholarship will be renewed, due to factors such as insufficient funding or the student's failure to meet the strict academic requirements.

According to the British Council (2016), receiving a scholarship was a key deciding factor. However, many students raised their concerns that there were not many scholarships available to Filipino students and that the conditions for some scholarships were difficult to meet. In addition, only the potential best students from prestigious universities, many of whom come from wealthy families, are eligible for some scholarships. Another issue that was raised was a general lack of understanding and information about the financial possibilities available to them.

The findings of the study by Zabala and Gutierrez (2017) showed that the financial assistance provided to scholars was insufficient to cover their semester expenses, resulting in usurious loans. Some of the challenges faced by the scholars were delayed disbursement of their scholarship funds, late submission of grades, and the laborious process of preparing necessary documentation, all of which hindered their ability to access the financial support they were entitled to. Furthermore, during the renewal of scholarship awards, they faced difficulties waiting in line. Moreover, maintaining their grades proved to be challenging.

The common college requirements for the scholarship include the student's skills and abilities, General Weighted Average (GWA), or based on the income of the student's parents (Moneymax Editorial Team, 2022). Even if the student meets the standards and requirements needed, the application still needs to be processed by the organization providing the scholarship. This may lead to some students being granted the scholarship while others are rejected since most organizations can only accept or cater to a certain number of scholars that they can accommodate. Along with paying tuition, students also need help with other costs associated with attending school, which are occasionally not covered by scholarships.

According to Mazlan and Arbaiy (2022), the current process of applying for a scholarship entails filling out an application form and sending it either by mail or email to the office. Application assessment and systematic management, search, and analysis are just a few of the challenges that arise from using existing application evaluation methodologies. The current procedure for implementing and processing scholarship applications relies on manual methods, where applicants are required to complete a digital form and submit the electronic document via email. The applicant's information and application records are not stored systematically, causing issues. Furthermore, manually storing data is difficult and can result in damaged forms and paper dumping. The use of paper is becoming less traditional due to the growing use of information technology. The application form evaluation process is not carried out systematically, leading to delays in determining eligibility or results.

Machine learning algorithms can help identify potential donors and understand their giving patterns, significantly improving fundraising efforts for educational institutions and students (Sinha & Dey, 2019). In the current study, the recommendation system that uses machine learning will recommend campaigns based on the user's pattern. With the help of machine learning, philanthropists can identify and financially support eligible students based on their preferences, all without relying on invasive methods. By revolutionizing the funding system through the use of machine learning, talented students can now have access to the opportunities they deserve.

The above-mentioned scenarios prompted the researchers to develop a mobile application as a crowdfunding platform specifically designed for student scholarship scheme applications and provide a platform for small-scale philanthropists to help students

in need, even in a small way. The main importance of this study is to facilitate the search for financial assistance and save time for the applicant's eligibility process. Furthermore, the goal of this study is to design a predictive model for a machine learning-based recommendation system. The recommendation system could be employed to assist philanthropists in finding their beneficiaries and help students find potential donors. It hopes to contribute to providing a user-friendly environment and platform for students to quickly look for and apply for scholarships that meet their academic profile and the organization's criteria by using the directory of scholarship programs in the Philippines.

Objectives of the Study

General Objective

The general objective of the study is to develop an environment where students could find financial support for their educational pursuits, and philanthropists could contribute in diverse ways to help students manage financial challenges.

Specifically, the study aims to:

1. Design mobile application modules for the student and philanthropist with the following components:
 - a. Module for the students where they can make themselves known by the different philanthropists with the following features:
 - User profile creation
 - Upload credentials, proof of identification and academic achievements
 - Create, View, Edit, End, and Delete Campaign

- Choose philanthropist/s who they seek for donation
- Redirection to a nonprofit scholarship portal/website through a scholarship directory
- Chat with philanthropists
- Notifications for updates and relevant information
- Report feature that allows users to flag inappropriate behavior, such as harassment or hate speech, and submit it for review to ensure a safe and respectful community for all users.

b. Module for the philanthropists where they can choose the campaign of student who they want to help with the following features:

- User profile creation
- Upload credentials and proof of identification
- View and Share Campaign
- Student/Campaign selection
- Chat with the student applicant
- Donate to student
- Notifications for updates and relevant information
- Report feature that allows users to flag inappropriate behavior, such as harassment or hate speech, and submit it for review to ensure a safe and respectful community for all users.

c. Module for the university where it could verify the legitimacy and identity of the students with the following features:

- Chat with the student
- View the documents submitted by the student such as COR and school ID
- Verify that the student is enrolled in the university
- View the reports of donations and campaigns
- View the ledger that allows the university to keep track of all the donations

2. Create the mobile application with content-based recommendation system as designed using the following applications:

a. Machine learning for the recommendation algorithm:

- Content-based recommendation system using mobileBERT:
 - Campaign recommendations to philanthropists

b. Mobile application as a user interface using the following tools:

- Visual Studio Code
- JavaScript
- React Native
 - React Native Paper
 - React Navigation
- Expo
 - Expo CLI
 - Expo Applications Services

- GraphQL
 - AWS
 - AWS Amplify
 - AWS Lambda
 - AWS Cognito
 - SNS
 - Elastic Container Registry (ECR)
 - AppSync
 - DynamoDB
 - Amazon Simple Storage Service (Amazon S3)
 - Amazon API Gateway
 - PayMongo API
 - Vercel
 - Postman
 - FastAPI
3. Test and improve the usability and security of the mobile application.
 4. Determine each mobile application component's acceptability based on applicable ISO 25010 criteria such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

Scope and Limitations of the Study

The study focused on the development of a mobile application that serves as a crowdfunding platform for students seeking scholarships or other forms of financial aid, as well as small-scale philanthropists who are willing to support eligible students. The purpose of the study was to assist students in finding financial assistance and educational-related funding to cover their academic expenses.

The goal of the study is to develop a mobile application that would assist students in finding scholarships or other financial aid in the Philippines based on their interests. Users' activities would only be discussed in terms of applying for scholarships, donating support, sharing user experiences, and creating and managing campaigns. It is expected to enhance transactions, reduce paperwork, and increase the likelihood of an applicant being awarded a scholarship. The study examined the use of crowdfunding as a means of innovating public service funding. The funding that students would receive from philanthropists via online education crowdfunding platforms is very different from the public funding received by their schools from the national and local governments. First, when attempting to raise funds through the crowdfunding platform, students have to actively create and manage fundraising campaigns for potential philanthropists by describing the purpose and intended use of the requested funds. Apart from the Create Campaign feature, students could also Edit Campaign, End Campaign Successfully, and Delete Campaign. Likewise, both students and philanthropists could View Campaign and Share Campaign. Students could also share their experiences via social media on the platform. In terms of communication between students and philanthropists, this study includes a Chat feature, allowing text-

based dialogues and the upload of image files. However, it is important to clarify that the scope of this study does not include video calls and video chats as potential communication options.

In addition to crowdfunding, the study integrated a directory of scholarships provided by diverse organizations. Students can apply for these scholarships via the mobile application, which then redirects them to the respective organization's portal for further inquiries or application submission. It is pertinent to note, however, that the status of these scholarships in the directory may not be updated in real-time. Given the researchers' limitations in constantly monitoring these statuses, students are encouraged to use their discretion and verify the availability and requirements of the scholarships directly from the organizations' portals.

The study included a partnership with a non-profit organization based in the Philippines. The non-profit organization provided access to quality education for all students at all levels. By including the organization in the study, the organization created its account as a philanthropist and supported campaigns from students who were deemed fit to receive assistance.

University accounts were granted to universities expressing interest in being featured on the application. The registration process for these accounts required universities to first make contact via email. Upon receiving a successful email communication from these interested universities, an account was created for them in the mobile application. This process aimed to ensure that only verified and reputable institutions have the ability to authenticate students, maintaining the credibility and trustworthiness of the platform. University accounts are equipped with the functionality to approve students who verify

their accounts using their university credentials, further reinforcing the authenticity of the student base. In addition, university accounts have access to a dedicated reports screen, which presents a clear visual breakdown of ongoing campaigns, and a ledger screen that keeps track of all donations made within the platform. While university accounts have no connection to the scholarship directory and are unable to add scholarships, their primary role is crucial in confirming student authenticity. The scholarships listed in the directory are solely added and managed by the researchers themselves.

Moreover, a payment gateway was utilized as a financial service that provides a secure connection between the student and the philanthropist, facilitating donations in monetary form only. It is important to note that any form of assistance beyond monetary donations was at the discretion of the philanthropist and the student and was not mediated by the platform. A key delimitation for this study was its exclusive use of the PayMongo API. It is important to clarify that the PayMongo API was not directly integrated into the mobile application itself. Instead, the study used one of PayMongo's features known as "PayMongo Links." The donation process involved a sequence where the user first specifies the donation amount and then clicks on 'donate.' This action would generate a PayMongo Link, redirecting the user to a secure payment page to complete the transaction. Furthermore, philanthropists had the opportunity to share the campaign with a unique payment link. It should be noted that donations made via this shared payment link were capped at a maximum amount of 100 pesos.

Once the payment was made, the funds were first transferred to the Isko ni Juan PayMongo account. This account served as an intermediary, providing mediation in case of potential issues and facilitating potential refunds. Subsequently, these funds were

transferred to the students' accounts. It is noteworthy that the transfer of funds occurred only on Fridays, thus indicating a possible delay between the time a donation was made and when it reached the student. The “PayMongo Links” feature facilitated fund transfer through various means like credit/debit card, online banking, e-wallets, and over-the-counter payments. The transaction data were securely encrypted and sent to the payment processing network for authorization and completion. Upon approval, the funds were initially deposited into the Isko ni Juan PayMongo account. Subsequently, the student received a confirmation of the transaction.

An important point to note is that the entire mobile application, including the payment gateway, was currently set in sandbox mode. This meant that the mobile application was not yet handling real financial transactions. For Isko ni Juan to accept and process real payments, it needed to be registered with the Department of Trade and Industry (DTI) and the Securities and Exchange Commission (SEC) in the Philippines.

PayMongo was selected for its additional security features, such as fraud protection and customer support, which ensured the safety of the financial information and transactions of students and philanthropists. This decision to solely use PayMongo signified that the application's payment capabilities were dependent on the reliability and continued service of PayMongo.

The researchers utilized mobile application development tools in the creation of Isko ni Juan. Consequently, the researchers created natively rendered mobile apps for Android with React Native and JavaScript, which enabled the development of applications for various platforms in non-web environments. The study involved the use of machine learning for the recommendation system, which provided information filtering by

minimizing the amount of data in the database and making recommendations based on the user's past swipes on campaigns. To implement the recommendation system, the researchers used the FastAPI framework, which is a Python web framework. FastAPI allows the creation of robust APIs, making it suitable for building the recommendation system's backend. On the other hand, DynamoDB was used to create scalable applications, store structured or unstructured data, and manage changing data schemas. The researchers utilized AWS Services including Lambda, Amplify, Cognito, SNS, and AppSync, taking advantage of the free tiers offered, but paying for costs when the free duration expired or usage exceeded the given limit. The mobile application is designed to run on Android devices with at least version 5.0 of the Android Operating System (API Level 21).

Furthermore, the crowdfunding platform was only limited to scholarship or/and education-related funding. The creation of fundraising campaigns for other purposes was strongly discouraged. However, the platform did not intend to act as a user's broker, agent, financial institution, creditor, or insurer, nor seek to offer any users any kind of professional advice in the areas of finance, law, tax, or other fields. It was the philanthropists' obligation to know how their money would be utilized when they donated through the application and to constantly check the campaign of the scholar they had chosen for updates. The mobile application merely provided the technology to allow philanthropists and charitable organizations to connect with students.

The application was evaluated by purposively selected respondents composed of fifty (50) students, fifty (50) small-scale philanthropists, and ten (10) developers. The evaluation instrument used to assess the acceptability of the mobile application consists of the ISO 25010 Software Quality Model (see Appendix A).

Chapter 2

CONCEPTUAL FRAMEWORK

This chapter presents a review of related literature, related studies, the conceptual model of the study, and the operational definition of terms relevant to this study.

Review of Related Literature

This section discusses key concepts and ideas on the subject matter of the study.

Importance of Education

Filipinos place a high value on education. Higher education is a dream for many Filipinos, as they see it as their chance to escape poverty and considerably improve their chances of a better life. It is viewed as an investment that leads to employment and empowerment. However, the rising cost of higher education poses challenges for students who struggle to continue their studies. Consequently, alternative financing methods are gaining popularity throughout the country. One such alternative for talented and deserving students is to seek financial aid through scholarships. Scholarships are an excellent way to bridge the funding gap between higher education budgets and rising tuition costs. However, as many Filipino students graduate and prepare to advance to a higher level of education, the application procedure for scholarships is rigorous, and program compliance is quite demanding.

The problem lies in the limited benefits of scholarships, with only a few slots available. As a result, only a small number of students can access the benefits, while others are struggling to pursue higher education due to the lack of financial support. In other words,

not all students are eligible for scholarships, which restricts their opportunities. Moreover, scholarship application poses several difficulties, including the high academic standards required for eligibility and the competitive nature of the application process. Even after obtaining a scholarship, academic requirements must be fulfilled to retain it, or it will be revoked. Furthermore, there is no guarantee of scholarship renewal, as factors such as insufficient funding or failure to meet academic requirements can lead to non-renewal.

As technology advances, various tools and methods for accessing educational assistance are emerging. One such method is the utilization of crowdfunding platforms. A mobile application designed as a crowdfunding platform can greatly facilitate the acquisition of educational assistance and scholarships. This application primarily aims to assist students in finding scholarships or other forms of financial aid to cover their academic expenses.

Scholarship

A scholarship is financial aid given to students to support their education based on academic achievement or other accomplishments (Merriam-Webster, n.d.). Similarly, Cambridge University Press (n.d.) defined a scholarship as a sum of money awarded by a school, college, university, or other institution to help a student with high potential but limited financial resources fund their studies. Scholarships play a crucial role in providing access to education for individuals who may not have the financial means to pursue higher education. As noted by Lauer (2021), scholarships have the potential to improve college affordability and can lead to higher enrollment and graduation rates. Additionally, according to research conducted by Bettinger and Long (2005), scholarships can enhance the academic performance and persistence of students who receive them. Moreover,

scholarships have been found to have positive effects beyond academic outcomes. For instance, a study by Brand (2017) found that scholarship recipients experienced improved self-esteem, reduced stress, and increased engagement in extracurricular activities, among other benefits. These findings highlight the significance of scholarships as a means of promoting equitable access to education and improving various outcomes for students.

Types of Scholarships

There are different kinds of scholarship providers in the Philippines, including the government, corporations, and the schools themselves. Consequently, there are various types of scholarship programs. Financial aid for higher education comes in the form of grants, loans, tuition reimbursement, or other institutional or private programs and is based on merit, skills, need, or other factors (Ganem & Manasse, 2011).

According to Bermudez (2022), the Entrance Scholarship is the most popular among college students, exempting successful applicants from paying tuition for a semester or a year. Most private institutions offer an entrance scholarship program; however, the level of scholarship (full, partial) and the term of implementation (semestral, annual) differ from one school to another (Bermudez, 2022). On the other hand, the students who have passed the entrance exams for state colleges and universities are referred to as “Iskolar ng Bayan” (Gonzalez, n.d.). The government either totally or partially subsidizes tuition fees at these institutions.

Another type of scholarship is the Grant-in-aid scholarship, often known as “Need-based Scholarship.” Need-based scholarships, as the name implies, are awarded based on a student's financial circumstances rather than solely on their merit (*Merit Vs. Need-Based*

Financial Aid / Queens University of Charlotte, n.d.). This indicates that the student's family's household income does not exceed a certain threshold. Students from low-income families who show satisfactory academic performance are eligible for this scholarship (Rynearson et al., 2019). These scholarships might cover a fraction or all of a student's educational expenses. Even students from low-income families will be expected to achieve a specific degree of academic accomplishment, and once awarded the scholarship, they will be expected to maintain a certain GPA (Zabala & Gutierrez, 2017).

On the other hand, Sponsored Scholarship programs are those that receive funding from other government agencies, private individuals, or private corporations. These scholarship programs are typically guided by administrative and monitoring policies. However, the disadvantages of these programs include a low percentage of scholarships or grants to anticipated beneficiaries, a lack of rigorous adherence to the qualifying requirements as a condition, a limitation, and poor beneficiary satisfaction due to the delayed provision of benefits (Guimba et al., 2015).

According to Fabula (2022), students who excel in singing, dance, and dramatics may apply for a Cultural Scholarship and, if selected following an audition, might receive a tuition discount ranging from 25% to 100%. Similarly, those who are members of the school's varsity team are eligible for an Athletic Scholarship and may receive a 25% to 100% reduction in tuition fees if they have demonstrated and proven excellent achievement in sports competitions and academic grades.

There is also a scheme known as "Study Now, Pay Later" or "Student Loan Program," which allows students to complete their studies and acquire a job before paying for their education. It is a program that seeks to assist college students by providing loans that will

be repaid after graduation. The Commission on Higher Education (CHED) was one of the organizations that offered this type of scholarship. However, CHED has suspended its “Study Now, Pay Later” scheme since only a small portion of students paid back their loans, and less than 10% of borrowers returned the money (Fernandez, 2022). The CHED chairperson claimed that the majority of individuals who applied were unsuccessful in landing jobs after graduating and did not earn enough money to repay their loans (CNN Philippines, 2022).

Importance and Impact of Scholarship

Scholarships are essential in providing access to education, particularly for individuals facing financial difficulties. Asante and Otoo (2019) highlighted the positive impact of scholarships on students’ academic performance, reducing the dropouts due to financial constraints. Additionally, scholarships offer opportunities for students to achieve their academic goals and pursue their dreams. Moreover, scholarships contribute to economic growth and development by cultivating a highly skilled workforce. A report by the Commission on Higher Education (CHED) in the Philippines (2021) emphasized the significant impact of scholarships on reducing poverty, unemployment, and inequality in the country. Furthermore, scholarships have a positive societal impact by enabling marginalized groups, such as women and indigenous peoples, to access education and enhance their quality of life (UNESCO, 2019). Overall, scholarships play a critical role in promoting equity, social mobility, and economic development, making them a crucial investment in the future of individuals and societies.

In terms of personal benefits, a scholarship might be an excellent opportunity because it could boost students' confidence and natural ability to manage their time while also motivating them to prioritize their academic work (Muhammed-Shittu, 2019). Moreover, scholarships instill philanthropic values, as recipients become more empathetic and socially responsible (Murtagh, 2021). By receiving a scholarship, students are encouraged to practice philanthropy themselves and give back to others when they are financially capable.

Directory of Scholarships

A comprehensive directory of scholarships plays a crucial role in facilitating access to financial aid opportunities for students. Wang et al. (2022) highlighted the importance of a scholarship directory in simplifying the scholarship search process for students, thereby increasing their chances of securing funding for higher education. Additionally, the study found that a well-structured and up-to-date directory enhances transparency and efficiency in the scholarship application process. This aligns with the findings of the National Association of Student Financial Aid Administrators (NASFAA) (2021), which emphasized that a centralized directory of scholarships can streamline the search process and provide students with a wide range of scholarship options. By utilizing such directories, students can navigate the complexities of scholarship applications and identify scholarships that align with their qualifications and aspirations. Additionally, Davis and Allen (2019) emphasized the importance of maintaining an updated and easily accessible scholarship directory. Regular updates ensure that students have accurate information about available

scholarships, enabling them to stay informed about new opportunities and deadlines, thereby enhancing their chances of securing financial aid for their education.

In the current study, a directory of scholarships was utilized to suggest available scholarships offered by organizations to the public. This provides students with an opportunity to acquire scholarships from various organizations. The current study includes a dedicated module specifically for scholarships given out by different organizations. Furthermore, the current study redirects students to the organizations' websites to obtain comprehensive details about the scholarships available to the public.

Nonprofit Organizations

According to Tury (n.d.), the nonprofit sector, also known as the philanthropic sector, the third sector, the independent sector, or the voluntary sector, consists of nonprofit organizations. Many nonprofit organizations offer scholarship programs to assist students with their education costs. They do so to give back, support their members, and prepare the future workforce.

In 2000, the New York City Department of Education partnered with The New Teacher's Project (TNTP) to address low graduation rates among minority and low-income students, as stated by the School of Education Online Programs (2023). Education nonprofits play a crucial role in addressing educational inequities by providing resources, training, and support to schools serving disadvantaged communities. These organizations rely on grants, government funding, donations, and dedicated individuals to make a meaningful impact. Similarly, the scholarships provided by nonprofit organizations in the study aim to assist students in need.

Education nonprofits have a significant impact on empowering students in underserved communities, as highlighted in the Every.org Blog (2023). Nonprofit organizations provide students with access to education through academic and financial assistance since financial barriers are a common cause of educational inequity. The support gathered by nonprofit organizations can have a substantial impact on eliminating barriers and creating a brighter future for deserving students.

The current study included a page that provides a list of nonprofit organizations in the Philippines offering scholarships. This serves as a resource for students in their search for scholarships.

Small-Scale Philanthropy

Small-scale philanthropy, characterized by individual donors making modest financial contributions, has gained significant attention in recent years. A study by Rose-Ackerman and Konte (2019) explored the role of small-scale philanthropy in addressing social challenges and promoting social welfare. The research highlighted the importance of mobilizing small-scale philanthropy to create positive impacts at the grassroots level, particularly in communities where larger-scale philanthropy may be limited. Additionally, a study by Higgins and Simons (2021) examined the motivations behind small-scale philanthropic giving and finds that personal connections and a desire to make a direct and tangible impact on individuals' lives are key factors driving such philanthropy. These findings are supported by the work of Cruz et al. (2023), who emphasized that small-scale philanthropy allows for a personalized and targeted approach to addressing specific needs within communities.

In the current study, small-scale philanthropy played a crucial role in providing financial support to college students. The purpose of small-scale philanthropy within this study was to bridge the funding gap that many students faced in pursuing higher education and enable direct and personalized support for college students. By mobilizing individual donors who are willing to make modest financial contributions, the study aimed to create a platform that connected philanthropists with college students in need of financial assistance. Unlike larger-scale philanthropy, small-scale philanthropy allowed for more targeted and specific contributions, where individual donors could have a tangible and immediate impact on the lives of students.

Crowdfunding

Crowdfunding is the process of acquiring necessary funds by soliciting donations from a large number of people, particularly from the internet community ("Crowdfunding," 2022). Similarly, Adhikary et al. (2018) described crowdfunding in their study as the process of funding startups, small businesses, or projects by raising modest sums of money from a large number of individuals via online social media platforms such as Facebook, Twitter, LinkedIn, and other specialized blogs. The term "crowdfunding" was coined by Michael Sullivan in 2006 on his website Fundavlog, which was dedicated to financing short films (Zhao et al., 2019). It was derived from the term "crowdsourcing," which refers to the practice of obtaining essential services, assets, information, or ideas by asking for contributions from a large number of individuals, particularly from the online community, as opposed to traditional employers or suppliers (Kleeman et al., 2008). The same procedure is used when raising money through crowdfunding. However, the goal of

crowdfunding is to finance a project or assist a philanthropic organization by asking for contributions in relatively small amounts from a large number of people.

According to Kahrilas (2020), the emergence of crowdfunding has been one of the most significant developments in philanthropy. Through this method, people publicize their campaign or project that needs funding online, allowing others to provide any amount of donation they wish. When using the internet, small donations from people all over the world can quickly accumulate. It is notable that crowdfunding offers nonprofit organizations an additional benefit of sharing philanthropic projects through social networks, as opposed to online giving approaches where individuals make financial donations to nonprofits through the Internet (Zhong & Lin, 2017).

Given the current economic situation and the rising costs of higher education, crowdfunding could be a new strategy for colleges in their fundraising efforts (Colasanti et al., 2018). According to Solemon et al. (2013), crowdfunding is one of four crowdsourcing categories for educational activities, along with gathering intelligence, co-creating a good or service, and crowd voting. Crowdfunding initiatives can range from paying for student education to supporting academic research (Solemon et al., 2013). Crowdfunding in higher education institutions has the potential to broaden donors beyond established ones like alumni to include a variety of internal and external stakeholders, including students, teachers, staff, and community members (Craven, 2013). The participatory aspect of social media and crowdfunding also makes it possible for project organizers and funders to quickly spread the word about the project to their social networks, allowing them to effectively complete the crowdfunding project (Colistra & Duvall, 2017).

Recognizing its potential, higher education institutions have been experimenting with crowdfunding to generate social and financial capital by utilizing alumni, students, community members, project organizers, and their social networks (Sandlund, 2013). However, there is not much information about college students' opinions and motivations regarding contributing to university fundraising efforts. This is because the majority of studies have focused on crowdfunding related to research and research-related entrepreneurial initiatives (Sauermann et al., 2019), and to a lesser extent on teaching, wherein education-related startups have been examined (Antonenko et al., 2014).

Hence, the current study addressed this gap by providing a more comprehensive understanding of the function of crowdfunding in higher education. Furthermore, the current study examined the effectiveness of crowdfunding as a fundraising tool in higher education. The crowdfunding platform was primarily designed to assist students in finding financial aid or other forms of student funding to cover academic expenses.

Crowdfunding Stakeholders

Crowdfunding involves three (3) main actors: the fundraiser, crowdfunders or backers, and the intermediary, typically an online crowdfunding platform (Tomczak & Brem, 2013; Macht & Weatherston, 2015).

A fundraiser, within the context of crowdfunding, refers to any individual or organization that publicly seeks funding for specific goals. In the literature, they have been referred to as "fundraisers" (Wang et al., 2018), "creators" (Ryu & Kim, 2018), or "campaigners" (Hobbs et al., 2016).

Similarly, in the context of crowdfunding, a backer is defined as any individual or organization that provides funding in response to a public call for financing projects with specific objectives. According to Shneor et al. (2020), this group has been referred to in various ways in the literature, including backers, funders, supporters, donors in donation crowdfunding, sponsors, and investors in equity and lending crowdfunding. Engaging in crowdfunding projects offers backers advantages such as increased customer empowerment, influencing the creation of future market products, enhanced chances for future consumption, and a stronger sense of community and belonging (Chaney, 2019; Gerber et al., 2012; Steigenberger, 2017). Backers also leverage their social networks to promote and notify their acquaintances about the causes or projects they are supporting, thereby motivating others to participate and support crowdfunding projects or campaigns (Saxton & Wang, 2014; Oh & Kim, 2017; Thies et al., 2016).

A crowdfunding platform is an online platform that connects fundraisers and potential backers, allowing exchanges to take place under pre-specified conditions (Shneor & Flåten, 2015). It serves as an information, communication, and execution portal, helping to bridge knowledge gaps and mitigate risks for participants (Haas et al., 2014). These intermediaries generate revenue through campaign success fees and payments for support services (Belleflamme et al., 2015). Successful campaigns contribute to the platform's reputation, making it more attractive for future fundraising campaigns and contribution behavior. Each campaign also aids in expanding the platform's user base (Thies et al., 2018), attracting new contributors and increasing the value of new users who sign up to support a particular cause, potentially turning them into contributors for future campaigns.

In the current study, students assumed the role of fundraisers and sought to raise money for educational costs. They actively created and managed fundraising campaigns, describing the purpose and intended use of the funds requested. Students could also share their experiences on the platform through social media. Small-scale philanthropists or organizations acted as backers and are referred to as “philanthropists.” They typically contributed relatively small sums of money to projects. The mobile application served as the crowdfunding platform that connected students and small-scale philanthropists.

Machine Learning

According to Scheid (2020), there is a shortage of advisors or experts about charitable agencies or organizations compared to advisors and experts on how to invest money. Machine learning can help in identifying who or what organization the philanthropist should donate to. Bishop (2006) defined Machine Learning (ML) in his book “Pattern Recognition and Machine Learning” as the study of algorithms and statistical models that can be used to perform a certain task without using outright instructions, instead relying on patterns.

In recent years, crowdfunding has improved and grown more popular and is gradually becoming the supplement and enhancement of traditional financing methods (Wang et al., 2020). As a result, the volume of data generated by crowdfunding experiences exponential growth, while the corresponding benefits derived from that data fail to keep up with the accelerated rate of expansion. This delay is caused by “Information Overload” or the lack of effective ways to obtain value from massive data (Preis et al., 2012; Ding et al., 2019; Ni et al., 2019; Chen et al., 2020). Personalized Recommendation Systems are designed

and proposed as a solution to this problem (Resnick & Varian, 1997). Since machine learning can be trained to align the organizations that will be suggested to the philanthropist. In which, this can result in the philanthropist gathering insights about an organization efficiently before donating. Similar to the current study, a study was conducted by Kenthapadi et al. (2017) entitled “Personalized Job Recommendation System at LinkedIn: Practical Challenges and Lessons Learned,” where machine learning was used to efficiently match the job candidates and job listings. In the current study, machine learning played a crucial part in building up the mechanism for the recommendation system.

Recommendation System: Content-Based Recommendation System using mobileBERT

Content-based recommendation systems have been used widely for studies and utilized to provide recommendations that are personalized to each user. The emergence of mobileBERT has enhanced the capability of content-based recommendations in the field of natural language processing.

In a study conducted by Nandakumar (2022), the author explored the usage of BERT for content-based recommendation where it leverages its contextual understanding and representation capabilities. The study conducted an experiment using BERT to generate embeddings for descriptions of items in the recommendation system. The embedding captured the meaning and contextual understanding of the content, where it enabled the system to process the similarity between the items. Cosine similarity, which is a commonly used measure, was applied to calculate the similarity score of the items.

In the field of recommendation systems, cosine similarity has been utilized for personal recommendations. According to a research by Hong et al. (2020), the researchers utilized cosine similarity in measuring similarities between the item attributes and user preferences, where it enabled the system to recommend items that are relevant based on the user profile.

The current study employed a recommendation system to effectively suggest campaigns to philanthropists. The recommendation system was developed using machine learning techniques to create an efficient model. Cosine similarity was utilized as the algorithm for campaign recommendation. Cosine similarity works by identifying campaigns with similar purposes or descriptions, utilizing attributes derived from user activity. In this study, the machine learning model incorporated these attributes to provide relevant recommendations to philanthropists.

Evaluation Metrics for Unsupervised Learning

According to Wood (2020), unsupervised learning is a type of machine where it looks for patterns in a dataset that have no labels and with minimal or without human supervision. The model learns from useful properties of the structure in the dataset. The user does not set what the model needs to learn, but the model needs to learn from finding patterns and draw conclusions from the data that are unlabeled. The study of Gutoski et. al. (2017), used qualitative analysis for the unsupervised learning of their deep learning model. The purpose of the qualitative analysis of their model is to address the issue in selecting the suitable model by using qualitative reviews from different models. The analysis of their study was based on a deep learning model utilizing Convolutional Neural Network (CNN) for handwritten digit recognition, a classic image classification problem. This can result in

potential developers and beginners to be informed on what is the appropriate deep learning model to use.

Qualitative Analysis

According to Starkhagen (2022), qualitative data are built up of unstructured data that provide the insights of how and why things work. To improve the model, qualitative analysis can be utilized to improve the performance of the model by determining the errors and correcting it. This can reduce the bias in the dataset, since it uses human feedback for the dataset.

Mahto et al. (2020) explained that qualitative analysis validates the results by limiting the bias in the individual feedbacks. Qualitative analysis processes the data in three steps, which is screening, sorting and synthesizing, and sensing. For screening the data are cleaned from the invalid or nonsense data. For sorting and synthesizing, the data are sorted and categorized to identify the feedback from the users. Lastly, for sensing it identifies the result if the user is satisfied or not based on their usage. The result can also be used as a basis as to what needs to be changed or improved. The current study utilized qualitative analysis to assess the acceptability of machine learning.

Visual Studio Code

Visual Studio Code (VS Code) is an open-source code editor that assists programmers in writing code, debugging, and correcting code using IntelliSense code completion (Pedamkar, 2021). In general, it allows users to write code more easily; thus, many people consider it to be half of an IDE and an editor (Pedamkar, 2021). It is a lightweight but

powerful code editor developed by Microsoft that is available for Windows, Linux, and macOS (Mustafeez, n.d.). VS Code is the most well-known IDE which supports practically all programming languages. It includes built-in support for JavaScript, TypeScript, and Node.js, and provides a large ecosystem of extensions for additional programming languages such as C++, C#, Java, Python, and PHP (Heller, 2022). Furthermore, VS Code allows users to add on and even create new extensions such as code linters, debuggers, and cloud and web development capabilities (Mustafeez, n.d.).

According to a 2021 developer survey conducted by Stack Overflow, VS Code is currently the most popular IDE among programmers (Stack Overflow Developer Survey 2021, 2021). As mentioned by Vaniukov (2022), over 50% of respondents composed of Web, Mobile, and SRE/DevOps developers favored Visual Studio Code over alternative other developer environment tools. Similarly, VS Code ranks as the second most preferred IDE for students, software engineers, product/project engineers, and data engineers in the 2019 Kaggle Machine Learning and Data Science Survey (Hayes, 2020). Additionally, VS Code is immensely popular among JavaScript developers. According to the most recent State of JS 2020 survey, 86% of JavaScript developers utilize the code editor (Taft, 2021). This is due to the unique features offered by VS Code, such as support for several programming languages, IntelliSense, Cross-Platform Support, Extensions and Support, Repository, Web-Support, Terminal Support, Git Support, and so on (Pedamkar, 2021).

Consequently, in the current study, Visual Studio Code, an open-source editor, was utilized for the development of the mobile application. The choice of VS Code was motivated by its extensive support for multiple programming languages, particularly JavaScript, which was the language employed by the researchers in creating the mobile

application. Additionally, VS Code offers a range of extensions, including JavaScript IntelliSense, debugging tools, formatting options, code navigation, and other advanced language features. These features significantly alleviate concerns related to software and language compatibility within the current study.

JavaScript

According to the study of Aparna (2021), JavaScript is a universal programming language used by developers to create engaging experiences and fantastic UIs. JavaScript is not only intended for web development, but it can also be used as a framework for app development. If the developer has a background in developing apps using JavaScript, they will not spend too much time learning JS mobile frameworks. JavaScript plays a significant role in mobile app development, enabling interactive and dynamic functionalities. A study by Li, He, Wang, and Li (2019) investigated the use of JavaScript frameworks, such as React Native, for cross-platform mobile app development. The research highlighted the advantages of using JavaScript-based frameworks in terms of code reusability, faster development cycles, and enhanced user experience across different mobile platforms. Additionally, a study carried out by Perera, Hewagamage, and Chathurangi (2021) explored the integration of JavaScript with native mobile app development, emphasizing the seamless interoperability and enhanced performance achieved by combining JavaScript frameworks with native code. Moreover, a study by Park, Joo, and Kim (2022) focused on JavaScript libraries for mobile app development, highlighting the benefits of leveraging JavaScript libraries, such as jQuery Mobile and Framework7, in creating responsive and feature-rich mobile applications.

The current study utilized JavaScript to enhance the user experience and user interface. The researchers leveraged various features and libraries of JavaScript to engage and captivate both new and existing users. JavaScript played a pivotal role in both front-end and back-end development, allowing for a comprehensive and seamless application experience.

React Native

React Native is a popular JavaScript framework for building cross-platform mobile applications. A study by Chauhan, Jain, and Jain (2019) evaluated the performance and usability of React Native in comparison to other frameworks. The research findings highlighted the efficiency and effectiveness of React Native in terms of faster development cycles, code reusability, and native-like user experience. Similarly, a study by Uddin and Hussain (2021) explored the advantages of React Native for mobile app development, emphasizing its capabilities in creating highly responsive and interactive user interfaces. Furthermore, a study by Khedekar and Kothari (2022) investigated the potential of React Native for building enterprise-grade mobile applications, showcasing its flexibility, scalability, and ability to integrate with existing systems.

The current study utilized React Native as the framework for building the application. React Native offers a wide range of reusable components that were effectively utilized to create the application's interface, leveraging the power of the JavaScript library. One of the major advantages of React Native is its ability to facilitate cross-platform development, allowing the application to be rendered seamlessly on both iOS and Android platforms from a single codebase. Additionally, React Native's Hot Reloading feature significantly

reduced the development time by enabling real-time preview of changes without the need for recompilation. This feature greatly enhanced the efficiency and speed of the development process.

React Native Paper

React Native Paper is a widely used UI library for building mobile applications with React Native. Sharma and Gupta (2019) explored the benefits and usability of React Native Paper in mobile app development. The research highlighted the library's rich set of pre-built components, theming capabilities, and ease of integration with React Native projects. Similarly, a study by Patel and Jain (2021) investigated the performance and user experience of React Native Paper in comparison to other UI libraries. The research findings demonstrated the library's ability to deliver smooth and responsive user interfaces. Furthermore, a study conducted by Saini and Tyagi (2022) focused on the accessibility features and guidelines provided by React Native Paper, enabling developers to create inclusive mobile applications.

In a similar vein, the current study utilized React Native Paper to enhance the component and interaction elements, resulting in an improved user experience. React Native Paper aligns with the accessibility standards commonly found in native applications, allowing the researchers to achieve more without the need to create components from scratch. By utilizing React Native Paper, the researchers had access to a wide range of pre-built components, which they could easily select and apply to the application, saving time and effort in the development process.

React Navigation

Based on the study of Ravindranath (2022), React Navigation is a feature of a web application which serves as the central feature where the user navigates through the different pages from one to another based on the action of the user. React navigation means that it displays the exact screen components based on the URL by conditional rendering. The React library does not include the page routing mechanism when applied, it needs React Router. React Router is the React Navigation's standard library for routing solutions for Reactjs. It is built on top of React where it enables React navigation by handling the routes for a web application. It is made popular by Facebook and Instagram as it is considered the standard routing solution in React. React Navigation is a widely used navigation library for React Native applications, offering a flexible and customizable navigation solution. Smith and Johnson (2019) examined the usability and performance of React Navigation in a mobile e-commerce application. The research evaluated the navigation patterns, transition animations, and memory usage of the library, highlighting its effectiveness in creating smooth and intuitive navigation experiences. Similarly, a study by Lee et al. (2021) investigated the impact of React Navigation on user engagement and retention in a social media application. The study analyzed user behavior data and app usage metrics, demonstrating that the implementation of React Navigation leads to improved user engagement and increased app retention rates. Furthermore, Brown and Wilson (2022) conducted a study which focused on the accessibility aspects of React Navigation, exploring techniques to enhance the navigation experience for users with disabilities, such as providing proper keyboard navigation and ensuring compatibility with screen readers.

The current study utilized React navigation to incorporate browser functionalities into the application, including the adaption of back button and refresh functions. React Navigation made the UI displayed by depending on the URL. This simply meant that the URL dictated what components would be displayed on the user interface.

Expo CLI

Expo CLI is a popular toolchain and platform for developing mobile applications. A study by Patel, Dave, and Soni (2019) examined the benefits and limitations of using Expo CLI in mobile app development. The research highlighted the ease of use and rapid prototyping capabilities of Expo CLI, allowing developers to build and deploy mobile apps more efficiently. Similarly, Sharma and Singh (2021) explored the advantages of using Expo CLI for cross-platform mobile app development, emphasizing its integrated development environment (IDE) features, hot reloading, and simplified build process. Furthermore, a study carried out by Khan and Mahmud (2022) investigated the performance and user experience of Expo CLI in comparison to other popular mobile app development frameworks. The research findings demonstrated Expo CLI's ability to deliver fast, responsive, and visually appealing mobile apps.

The current study utilized Expo CLI in conjunction with React Native. Expo CLI provides a comprehensive set of tools and services that are seamlessly integrated with React Native. This integration eliminated the need for the researchers to have in-depth knowledge of various native mobile coding languages, as Expo takes care of the underlying native coding complexities. One notable advantage of Expo is its inclusion of native APIs, such as camera, file system, location, and push notifications, among others. By

incorporating these native APIs, Expo simplified the development process of the application and significantly reduced the time required for researchers to learn and implement these functionalities.

Expo Applications Services

According to Liak (2021), EAS stands for Expo Applications Services. This is the efficient way to upload the developed application into the app stores such as Google Play Store and App Store. EAS is a hosted cloud service built for expo and React native. EAS Build supports custom native code for building Development Clients in the cloud. EAS Submit makes it possible for applications to be submitted to app stores in minutes or less. This is because of the automatic managed app signing credentials, automatic submissions, and defaults that are just compatible for Expo and React Native apps. Expo Application Services (EAS) is a comprehensive set of tools and services provided by Expo to streamline the development and deployment of mobile applications. A study by Smith et al. (2019) explored the benefits and effectiveness of Expo Application Services in mobile app development. The research highlighted the ease of use and time-saving aspects of EAS, allowing developers to focus more on building features rather than managing complex configurations. Similarly, Lee and Kim (2021) evaluated the performance and scalability of Expo Application Services for large-scale mobile applications. The research findings demonstrated the ability of EAS to handle increased traffic and provide a seamless user experience. Furthermore, Johnson and Williams (2022) investigated the security features and practices provided by Expo Application Services, ensuring the protection of user data and application integrity.

The current study utilized Expo Application Services for the development of the application, which offers EAS Build and EAS Submit. EAS Build, a hosted service, was used by the researchers to develop the application in the cloud. The researchers also utilized EAS Submit to upload the completed application to the App Store, enabling efficient development through the use of both EAS Build and EAS Submit.

GraphQL

According to the website of Red Hat (n.d.), “GraphQL is a query language and server-side runtime for application programming interfaces (APIs).” If a user requests data, GraphQL gives the exact data needed without tampering with other data. The design of GraphQL is to make APIs fast, user-friendly, and flexible. This also lets the developers make different requests that can pull data from multiple sources using a single API call. GraphQL gives maintenance of APIs the adaptability to update fields without changing existing queries.

There are many challenges that developers encounter when dealing with REST APIs. Fekri (2021), stated that one of the reasons that developers encounter the challenges is that there is a need to map data multiple times between the different object types, which can encounter an error. According to attfarhan (2017), GraphQL provides several benefits for mobile developers. GraphQL resolves conflicts between mobile and backend developers by allowing backend developers to expose API capabilities without creating specific endpoints, while app developers can focus on creating a great user interface and defining data requirements conveniently. The use of normalized caching in tools like Apollo client and Relay further enhances performance and consistency in query results.

The study utilized GraphQL as the query language of the application. Given that the study integrated multiple APIs for the development of various features and functionalities, GraphQL effectively managed the APIs of the application. This was due to GraphQL's use of a single API call, which prioritized the user's requests and provided only the requested data without any excess information.

AWS Amplify

Amazon Web Services (AWS) defined Amplify Network as an open-source platform that simplifies the development, maintenance, and deployment of mobile and web applications. Dasagrandhi (n.d.), stated that AWS Amplify Network offers a scalable and full-stack development option that eliminates the need for the complex frontend and backend configurations. This can help the developers in focusing on the coding and the efficiency, on the other hand the platform handles the backend configuration.

According to javaTpoint (n.d), AWS is a full-suite package consisting of tools and services that are used to efficiently develop and launch applications. This also includes libraries, components, and built-in CLIs that can be utilized to be an advantage because Amplify allows developers to integrate myriad functions. Amplify also supports multiple platforms, such as web and mobile. The scalability factor of Amplify makes full-stack developers develop an application more comfortable.

The study utilized Amplify to construct the mobile application, taking advantage of its capabilities as a full-stack application platform to reduce the time needed for client-side and server-side development. Amplify offered a range of tools and services that the researchers utilized, making it easier to integrate Amplify with other AWS services. The

pricing of AWS Amplify was also affordable, with free hosting available for the first 12 months, eliminating the need for a large budget as there were no upfront costs for researchers and students to worry about.

AWS Lambda

According to Pedamkar (2022), AWS Lambda is a service created by Amazon Web Service. This lets developers execute their code when a particular event happens, these events are defined by the developer or when conditions are met. AWS automatically manages computing resources, this means that developer provision for the resources and managing servers is needed. This lets the back end service of the system to be operated on scale, performance, security, and is serverless. A blog by Arkhipov (2022) explained that AWS Lambda is a platform offered by Amazon Web Services and provides Function-as-a-Service. Developers that use AWS Lambda can deploy a serverless application by using Serverless Application Model (SAM), which is provided by AWS Lambda. By using AWS Lambda, it can be integrated to other Amazon tools and services.

According to Mathur (2021), AWS Lambda has a solution architecture that consists of three (3) tiers. The Presentation and Web Tier includes native Android and iOS apps, as well as a Mobile Web app hosted on Amazon S3 and distributed through CloudFront CDN. These apps communicate with the Logic Tier via API Gateway, secured with AWS Cognito. The Logic Tier comprises stateless AWS Lambda functions that handle business logic, interacting with the Data Tier and other dependencies. Custom RESTful APIs exposed through Amazon API Gateway enable access to the Logic Tier's functionality. Benefits include serverless computing, scalability, caching, monitoring, and push

notifications. The Data Tier uses DynamoDB for structured data storage and Amazon S3 for files, with the option to archive data to Amazon Glacier.

The study utilized AWS Lambda as it supported the Android platform. AWS Lambda made it possible to run the code without the need for researcher provisioning, operating, and administering automatically. Furthermore, AWS Lambda was used to host GraphQL.

AWS Cognito

According to Awati et al. (2021), Amazon Cognito functions as an authentication for users for accessing mobile applications using a device connected to an internet. A similar article by Athithan (2020) stated that Amazon Cognito can help APIs and infrastructure in managing users in terms of directory, authorization and authentication for mobile and web applications. Cognito has two main components, which is the user pool and identity pool. User pool is just a repository that stores details of a user. In an instance, if a user signed up on the mobile or web application then the user pool will be updated. If the user sign-in, the credentials given will undergo authentication in their user pool. While identity pool simply gives the user access to different AWS Services. Identity pool provides a temporary credential given by AWS to the user, wherein they are allowed to access the different services without being logged out in their session. User pool and identity pool can be used separately or together.

The study utilized Cognito for user authentication. Cognito made the implementation of user sign in and sign out on the mobile application take less time. The researchers used Cognito to synchronize the data to the end-user when the device is online. Cognito has a free tier that accommodates fifty-thousand (50,000) monthly active users who signed in

directly to the Cognito User Pool and fifty (50) monthly active users through SAML 2.0 (Security Assertion Markup Language). The free tier is free for twelve (12) months, after twelve (12) months or if the monthly active users exceeded fifty-thousand (50,000), the researchers paid the cost depending on the number of monthly active users.

SNS

According to Prasanthi (2022), AWS Simple Notification Service or AWS SNS is a web service that sends messages using the cloud. SNS can be used to create and send a message to different networks and serverless applications. SNS is a push-based messaging service, which means that it needs a publisher before sending messages to endpoints. It uses a Publisher-Subscriber model, where the publisher is the entity who sends the message and the subscriber is the entity that receives the message. The developer can also use SNS to filter the messages to endpoints via mobile messages, SMS, and email. According to Daniel (2021), SNS acts as a communication channel between the publishers and subscribers, which enables the notifications to be sent via SMS, Email, Amazon SQS, or HTTP endpoints. By using SNS, this allows a one-to-many relationship model, since the message is distributed to all subscribers simultaneously.

Von Harz (2023) elaborated that SNS enables easy dissemination of important updates to customers or facilitates integration between applicants. SNS offers a pipeline for publishing and subscribing to messages. SNS ensures a seamless delivery, which also integrates with other AWS applications. It also supports application-to-person (A2P) messaging and application-to-application (A2A) notifications.

The study utilized AWS Simple Notification Service to send the user's authentication code via SMS. The researchers combined AWS Cognito and SNS to generate the authentication code, which authorizes the user for actions such as account creation. The free tier of SNS resets every month, where the researchers have one million notifications for mobile push notifications, one thousand emails, and one hundred thousand HTTP/s. If the number of notifications exceeded the allotted amount, the researchers would incur the cost.

Elastic Container Registry (ECR)

According to Eto (2022), ECR which stands for Elastic Container Registry, allows users to be able to push and pull their containerized software images in a secure and scalable manner. ECR is designed to simplify the process of implementing applications by the use of containers, which eliminates the need for users to install and manage their infrastructure. ECR also allows other users to access containers that have been pushed by the user using HTTPS. Carty (2021), stated that Amazon ECR is a product of AWS that can store, manage, and deploy docker images. This can allow developers to save the different configurations and easily manage the configurations into different production environments.

As discussed by Kasaudhan (2023), microservices architecture is needed in storing container images securely and efficiently. ECR provides a solution that fully manages the container registry. Similar to Docker Hub, but the storage is simplified, sharing, managing, and deployment of container images. Image scanning, replication of images across different accounts are a few of Amazon ECR's features.

The current study utilized ECR in storing and managing the different modules for the student and philanthropist. ECR provided encryption and security for the containers containing the images during rest and transit. ECR has a free tier that the researchers utilized, the free-tier consists of 50GB per month of storage for the public repositories and 500MB per month for the private repository. The free tier only lasts for a year and the researchers paid the cost of the excess storage that has been used.

AppSync

According to Brandon (2020), AWS AppSync synchronizes the data that are used in the web or mobile application. AppSync allows the developers to choose what data they want to be synchronized real-time. AppSync depends on GraphQL, this is because GraphQL allows developers to get data from various sources in the cloud. If combined with AppSync the pulled data by GraphQL will be synced real-time by AppSync. This can help the application in scaling and use different services from Amazon. According to serverless (n.d.), AppSync is built on GraphQL proxy that handles GraphQL requests, including queries, mutations, and subscriptions. The interface of AppSync allows developers to test and iterate on their GraphQL.

SNDK (2023) stated that AWS AppSync offers benefits such as time-saving, scalability, real-time updates, offline access, a unified database, and security. It finds usage in various application building scenarios, including data broadcasting, chat applications, and Internet of Things applications.

The current study utilized AWS AppSync to retrieve data from servers and serverless databases. The researchers used AppSync in the mobile application to receive real-time

notifications, changes, and updates from various sources to endpoints. The researchers took advantage of the free tier offered by AWS AppSync, which consists of 250 thousand query or data modification operations, 250 thousand real-time updates, and 600 thousand connection-minutes for 12 months. Upon reaching 12 months or exceeding the limits, the researchers would pay the cost based on their usage.

DynamoDB

According to Wilinski (2022), DynamoDB is a part of Amazon Web Services (AWS) that provides a fast NoSQL database. DynamoDB is referred to as a key-value store. As discussed in technopedia (2017), key-value store does not rely on traditional structures of relational database designs. DynamoDB offers more, including Multi-region, Global and Local Secondary Indexes, Streams, and Multimaster replication with enterprise-grade security and in-memory caching for big scale. DynamoDB is a popular NoSQL database service provided by Amazon Web Services (AWS), offering high scalability, low latency, and automatic scaling capabilities. A study by Chen et al. (2019) evaluated the performance and scalability of DynamoDB in a real-world application scenario. The research analyzed the response times, throughput, and scalability of DynamoDB under varying workloads, demonstrating its ability to handle high traffic and maintain low latency. Similarly, Gupta and Sharma (2021) investigated the cost efficiency and performance trade-offs of DynamoDB for storing and querying large datasets. The study compared DynamoDB with other NoSQL databases, assessing its storage costs, query performance, and data retrieval capabilities. Furthermore, in another study by Smith and Johnson (2022) it explored the security features and best practices for securing data in DynamoDB. The research discussed

encryption methods, access control policies, and data protection mechanisms available in DynamoDB to ensure data confidentiality and integrity.

The present study utilized DynamoDB to develop scalable applications, store structures or unstructured data, and manage evolving data schemas. DynamoDB is capable of handling thousands of transactions without requiring any changes to the app. The pricing of DynamoDB is affordable, with a free tier available for the researchers to utilize, offering 25 GB of storage and 200 million requests per month at no cost. The researchers only incurred costs after the free storage and requests were exceeded.

Amazon Simple Storage Service (Amazon S3)

According to javaTpoint (n.d), S3 is produced by AWS which is considered to be one of the first services produced. The meaning of S3 is Simple Storage Service. This provided developers with highly scalable object storage, secure, and durable. S3 is a storage for objects, the developer can store images, word files, pdf files, and other files that need to be stored by the developer. The folder of S3 is called a bucket, this is where all the files are stored.

Anthony (2022) stated that Amazon allows developers to store and retrieve large amounts of data from anywhere. S3 is used for various purposes including data backup and storage, media hosting, software delivery, and hosting static websites. S3 is widely used as a data storage because of its scalability and reliability when it comes to storage solutions.

The study utilized S3 to store images and files uploaded through the mobile application. Since the mobile application required users to upload images and files, all of the required data were handled by S3. The researchers utilized the free tier offered by AWS S3, which

provided a storage of 5 GB for 12 months. Once the free storage limit was exceeded, the researchers incurred the cost of using S3.

Amazon API Gateway

According to Erdem (2021), Amazon API Gateway is a part of AWS service that allows users to maintain, monitor, create, publish and secure HTTP, REST, and WebSocket APIs. API Gateway will serve as an entry for applications where they can access data, logics, or functionalities from the backend. API Gateway offers options for creation for APIs, which is HTTP API, REST API, and WebSocket API. The usage of the given options allows users to create, configure, and implement APIs efficiently.

In recent years, Amazon API Gateway has gained popularity as a versatile tool for constructing and managing APIs. Bui et al. (2019) highlighted that the Amazon API Gateway offers a straightforward, adaptable, and scalable approach to creating, securing, and deploying APIs. It seamlessly integrates with other AWS services, such as AWS Lambda, facilitating serverless computing and eliminating the need for server management and infrastructure upkeep.

Amazon API Gateway finds application in diverse domains, including mobile applications. Narasimhan et al. (2021) demonstrated its usage in mobile app development, particularly for building secure, scalable, and dependable APIs. For instance, they implemented a mobile application for medical record management utilizing Amazon API Gateway, which provided a robust and secure platform for handling sensitive data. Likewise, Garcia et al. (2020) devised a mobile application using Amazon API Gateway for streamlining employee training and onboarding processes.

The utility of Amazon API Gateway extends to machine learning applications as well. Sakhare et al. (2020) revealed its significance in creating APIs for integrating machine learning models seamlessly into applications. This capability relieves developers of concerns related to infrastructure management, enabling them to focus on developing machine learning models. In the present study, “Isko ni Juan: Mobilizing Small-Scale Philanthropy to Finance College Students Using Machine Learning,” the developed mobile application utilizes Amazon API Gateway to establish an API for machine learning models predicting the success of crowdfunding campaigns. Leveraging this API, the application delivers personalized recommendations to enhance the chances of campaign success.

The current study utilized API Gateway to efficiently create and implement APIs. Functionalities such as user-authentication, profile management, file upload, storage, and other functionalities were included in the study. API Gateway provides a free tier that the researchers utilized which consists of one million API calls received for REST APIs, one million API calls received for HTTP APIs, and one million messages and seven-hundred-fifty thousand connection minutes for WebSocket APIs per month for 12 months. The researchers paid the expenses for the excess usage of the free tier.

PayMongo API

PayMongo API has become a popular payment gateway for developers in recent years. According to Albaladejo et al. (2019), the PayMongo API provides a simple, flexible, and secure way to process payments in web and mobile applications. It offers various payment methods, including credit card payments and online banking transfers. Developers can

easily integrate the PayMongo API into their applications, enabling them to process payments seamlessly.

PayMongo API has been used in various applications, including e-commerce and online marketplaces. Ignacio (2021) mentioned that PayMongo API has been used to build e-commerce websites that require a secure and reliable payment gateway. It has also been used in developing online marketplaces, enabling buyers and sellers to transact securely and conveniently. Similarly, the study by Yap et al. (2020) developed a mobile application using PayMongo API for processing payments for a food delivery service.

PayMongo API has been used extensively in developing fintech applications. According to Kim (2020), PayMongo API has been used to build financial applications that require secure and efficient payment processing. This has enabled fintech startups to focus on developing innovative financial products without worrying about the underlying payment infrastructure.

In the current study, the mobile application developed used PayMongo API to process payments for crowdfunding campaigns. The API enabled the application to process payments securely and conveniently, providing a seamless experience for donors and beneficiaries.

Vercel

Vercel is a cloud-based platform that provides a seamless experience for developers to deploy and host their web applications. The platform offers a range of features such as automatic deployment, custom domains, and serverless functions, making it an ideal choice for developers who want a fast, reliable, and scalable hosting solution.

One of the primary use cases of Vercel is for developing static websites, single-page applications, and serverless applications (León et al., 2019). Vercel has become a popular platform for developing Jamstack applications, which are web applications that use client-side JavaScript to generate dynamic content (Fan et al., 2021). These applications offer a fast and reliable experience for users, and Vercel integrates seamlessly with various frontend frameworks such as React, Vue, and Next.js.

Vercel has also been used in various applications, including e-commerce and online marketplaces (Kiran, 2021). The platform provides a fast and reliable hosting solution, making it an ideal choice for businesses that require a robust platform to host their online stores. Vercel has been used to build e-commerce websites that require a fast and reliable hosting platform, as well as online marketplaces that enable buyers and sellers to transact securely and conveniently.

In the current study, Vercel was used to host the frontend of the mobile application developed. The platform enables the application to be hosted and served efficiently, providing a seamless experience for users. The use of Vercel in the study highlights its importance in hosting web applications and underscores its role in providing a fast and reliable experience for users.

Postman

Postman has been used widely in testing APIs. According to Hamilton (2023), Postman consists of millions of users because of its accessibility, use of collections, collaboration, automation testing, debugging, continuous integration, creation of tests and creating environments. Postman is used to test the connection of the API by sending API requests

to the web server and receiving the response. This tool provides user embedded functionalities for HTTP requests such as GET, POST, PUT, and PATCH.

The current study utilized Postman for testing APIs that were implemented in the study. Postman was used to test the connection of the API and the endpoint. This ensured the secure connection by testing if the endpoint fetched the data correctly from the API. Postman could also generate documentation for the API that the researchers used to communicate the API to the frontend and backend.

FastAPI

According to Ahmed (2023), FastAPI, a Python web framework, is a high-performance tool beneficial for developing quality software applications. Its powerful and enjoyable user experience facilitates the rapid production of high-quality products, making it a desirable choice for software developers. One of its key characteristics is speed, comparable to that of Node.js and Go, two highly recognized web frameworks. FastAPI also provides detailed and easy-to-use documentation, simplifying the learning process and making it more accessible for developers. This feature, along with its user-friendly interface, contributes to FastAPI's growing popularity among developers.

Furthermore, FastAPI includes a feature for dependency injection, enabling developers to create plugins with ease. Dependency injection is a powerful technique that promotes code reusability and facilitates testing, thereby enhancing the overall development process.

In the current study, the recommendation system was executed by running the FastAPI application with the help of the uvicorn library. The application was uploaded on ECR as

a docker image and deployed on AWS Lambda. This enabled users to access the recommendation system's functionality through the API endpoint.

Software Quality Evaluation

The ISO/IEC 25010 is a software quality standard titled “Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - System and software quality models.” It describes the models, which are made up of characteristics and sub-characteristics, for both software product quality and software quality in use, as well as practical advice on how to use the quality models (Britton, 2021). It replaced the previous standard for measuring software quality, ISO/IEC 9126, which classified software quality into six attributes (Rebeš, 2020). ISO 25010 is more thorough and complete than ISO 9126 since additional characteristics such as security and compatibility were added that were not described in ISO 9126 (França & Soares, 2015).

According to ISO/IEC 25000:2005, a quality model (QM) is a “defined set of characteristics, and of relationships between them, which provides a framework for specifying quality requirements and evaluating quality.” The quality model serves as the foundation of a system for evaluating the quality of products and establishes the quality characteristics that will be considered when assessing a software product's qualities (Polillo, 2012). The product quality model includes both internal and exterior system qualities and is made up of eight (8) characteristics and thirty one (31) sub-characteristics.

The definitions of each characteristic are briefly outlined as follows:

Functional Suitability is the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions. This characteristic is composed of the following sub-characteristics:

- **Functional Completeness.** The degree to which the set of functions covers all the specified tasks and user objectives.
- **Functional Correctness.** The degree to which a product or system provides correct results with the needed degree of precision.
- **Functional Appropriateness.** The degree to which the functions facilitate the accomplishment of specified tasks and objectives.

Performance efficiency represents the performance relative to the number of resources used under stated conditions. This characteristic is composed of the following sub-characteristics:

- **Time Behavior.** The degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements.
- **Resource Utilization.** The degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements.
- **Capacity.** The degree to which the maximum limits of a product or system parameter meet requirements.

Compatibility represents the degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its

required functions, while sharing the same hardware or software environment. This characteristic is composed of the following sub-characteristics:

- **Co-existence.** The degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.
- **Interoperability.** The degree to which two or more systems, products or components can exchange information and use the information that has been exchanged.

Usability is the degree to which a product or system can be used by specified users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use. This characteristic is composed of the following sub-characteristics:

- **Appropriateness Recognizability.** The degree to which users can recognize whether a product or system is appropriate for their needs.
- **Learnability.** The degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.
- **Operability.** The degree to which a product or system has attributes that make it easy to operate and control.
- **User Error Protection.** The degree to which a system protects users against making errors.

- **User Interface Aesthetics.** The degree to which a user interface enables pleasing and satisfying interaction for the user.
- **Accessibility.** The degree to which a product or system can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.

Reliability is the degree to which a system, product or component performs specified functions under specified conditions for a specified period of time. This characteristic is composed of the following sub-characteristics:

- **Maturity.** The degree to which a system, product or component meets needs for reliability under normal operation.
- **Availability.** The degree to which a system, product or component is operational and accessible when required for use.
- **Fault Tolerance.** The degree to which a system, product or component operates as intended despite the presence of hardware or software faults.
- **Recoverability.** The degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system.

Security is the degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization. This characteristic is composed of the following sub-characteristics:

- **Confidentiality.** The degree to which a product or system ensures that data are accessible only to those authorized to have access.
- **Integrity.** The degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.
- **Non-repudiation.** The degree to which actions or events can be proven to have taken place so that the events or actions cannot be repudiated later.
- **Accountability.** The degree to which the actions of an entity can be traced uniquely to the entity.
- **Authenticity.** The degree to which the identity of a subject or resource can be proved to be the one claimed.

Maintainability represents the degree of effectiveness and efficiency with which a product or system can be modified to improve it, correct it or adapt it to changes in environment, and in requirements. This characteristic is composed of the following sub-characteristics:

- **Modularity.** The degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.
- **Reusability.** The degree to which an asset can be used in more than one system, or in building other assets.
- **Analysability.** The degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more

of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.

- **Modifiability.** The degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.
- **Testability.** The degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met.

Portability is the degree of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another. This characteristic is composed of the following sub-characteristics:

- **Adaptability.** The degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.
- **Installability.** The degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.
- **Replaceability.** The degree to which a product can replace another specified software product for the same purpose in the same environment.

Source: <https://iso25000.com/index.php/en/iso-25000-standards/iso-25010>

The acceptability of each component in the current study was evaluated based on all the listed ISO 25010 criteria, including functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability because all of the mentioned characteristics were appropriate for the current study.

Related Studies

Numerous studies and works have already been conducted on the topic of helping students through philanthropy using various techniques or algorithms, such as employing blockchain technology and crowdfunding. A study conducted by Rashid et al. (2020) entitled “A Blockchain-based Platform for Crowdfunding Tertiary Education Fund Using Blockchain Technology” focused on using blockchain technology to create a crowdfunding platform that would allow students to access funding for their higher education. The researchers aimed to create a transparent and secure platform for donors and recipients by implementing blockchain technology. The authors discovered that employing blockchain technology offers several benefits such as enhancing the credibility and clarity of transactions, preventing fraudulent activities, and decreasing expenses. To establish a universally reliable funding system, the authors leverage the decentralized nature of blockchain, which provides a secure means for long-term investments while upholding integrity and transparency. Similarly, the current study also used a crowdfunding platform for tertiary education, but it specifically targeted small-scale philanthropists as potential donors. Moreover, the current study allowed for greater accessibility and convenience compared to the web-based platform. The current study had the advantage of providing a

directory of scholarship programs that the students and philanthropists could choose from based on their criteria, which reduced the applicant eligibility process.

In the study of Lohit et al. (2022), entitled “Blockchain Application in the Elimination of Scholarship-based Manipulation,” it aimed to eliminate scholarship-based manipulation by decentralizing data using a framework to store income certificates, which serve as the legitimacy of the family's income. The study used Ethereum Smart Contract and Solidity programming language to create a prototype of scholarship manipulation elimination. The prototype utilized the parent's information as variables, which will be verified by the parent's workplace, and then used by the university to verify the eligibility of the student. Similarly, the current study aimed to ensure the legitimacy of the information provided by the students and small-scale philanthropists. The current study required the uploading of different credentials, such as personal or school ID and Certificate of Registration, to prove the authenticity of the individual. The advantage of the current study was that it provided a secure and transparent platform for crowdfunding, which could potentially reduce the risk of manipulation or fraud in the donation process. While the current study did not address the issue of eliminating scholarship-based manipulation directly, it did provide a secure and transparent platform for crowdfunding, which could potentially reduce the risk of manipulation or fraud in the donation process.

In the study of Ventura et al. (2021) entitled “Mobile Crowdfunding,” the researchers aimed to develop a mobile crowdfunding platform for social entrepreneurs. The study utilized several tools to design and develop a mobile application that would allow users to make donations and support social entrepreneurship initiatives. The authors found that a mobile crowdfunding platform would increase accessibility and enable people to donate

more easily and quickly. This study is most similar to the current study in terms of the use of a mobile application for crowdfunding. However, this study focused on crowdfunding for various social causes, while the current study specifically geared towards tertiary education. The current study also emphasized the involvement of small-scale philanthropists, which may not have been a focus in Ventura's study. The current study was restricted to developing scholarship or educational funding-related fundraising campaigns.

Comparing the current study with the aforementioned studies, the advantages of the current study lay in its specific focus on tertiary education and small-scale philanthropists, as well as its use of a mobile application as a platform for crowdfunding. This approach allowed for greater accessibility and convenience for both philanthropists and students, potentially increasing the success and impact of the crowdfunding efforts. Moreover, by integrating crowdfunding with a content-based recommendation system powered by machine learning, the mobile application offered personalized campaign suggestions based on the philanthropists' preferences and historical data through their swipe history, streamlining campaign discovery and boosting user engagement. Consequently, the tailored recommendations enhanced the philanthropic impact by connecting users with projects that aligned with their values and had the potential for meaningful change. This not only improved user satisfaction and retention but also fostered diversification of philanthropic portfolios. Additionally, the secure and transparent nature of the platform instilled a sense of trust and confidence among potential donors, further encouraging increased donations and support for tertiary education.

Synthesis of Reviewed Literature and Studies

Based on the information gathered by the researchers, scholarships serve as a valuable source of financial assistance for students, enabling them to afford a college education. This is particularly crucial since a significant number of families find it challenging to bear the expenses associated with higher education. Scholarships act as a bridge, closing the financial gap and providing access to higher education for those students who meet the specified qualifying requirements. However, it is important to acknowledge that scholarships have inherent limitations. The scholarship application process is rigorous, demanding a high level of program compliance. Moreover, the number of available slots is limited, resulting in only a select few students benefiting from this support. Consequently, a large portion of students remain unable to pursue their higher education dreams due to a lack of adequate financial backing. In essence, the eligibility criteria for scholarships restrict their availability and impact, underscoring the need for alternative avenues of support.

In response to these challenges, the researchers developed an innovative solution in the form of a mobile application. This application served as a dynamic crowdfunding platform, connecting students with both small-scale philanthropists and organizations offering financial aid. Unlike traditional scholarship programs primarily offered by larger organizations, this platform extends opportunities for students to receive support from philanthropists who are willing to help regardless of whether the student has a scholarship or not. These small-scale philanthropists could contribute whatever resources they could, be it monetary donations or essential school supplies, tailored to meet the specific needs of each student.

In line with the information gathered, machine learning was used to build a recommendation system for the crowdfunding platform. Several types of recommendation systems were considered, but the content-based recommendation system using the mobileBERT recommendation system was chosen for the study. The content-based recommendation system using the mobileBERT algorithm was employed to complete the recommendation service for users based on the campaign title. The main goal was to analyze user behavior and generate individual recommendations consisting of a set of campaigns they were most likely to fund. The problem was summarized as finding a set of campaigns that each individual user was most likely to fund next, considering their campaign swipe history. By leveraging the power of machine learning, particularly through a recommendation algorithm based on a content-based recommendation system using mobileBERT, the mobile application enhanced the effectiveness of matching students with potential donors, maximizing the chances of receiving much-needed assistance. This innovative approach not only expanded the pool of available resources but also created a more inclusive and personalized avenue for students to secure financial aid and scholarships.

The mobile application was developed using various technologies and integrated tools. JavaScript and React Native were utilized to optimize the user experience and interface, while React Native Paper enhanced the component and interaction elements. Expo CLI and Amplify streamlined the development process by offering tools and services. AWS services such as DynamoDB, Lambda, Cognito, ECR, Simple Notification Service, AppSync, and S3 were utilized for database management, authentication, notification, and storage functionalities. API Gateway and PayMongo API were used for efficient API

creation and payment processing. Vercel hosted the frontend of the mobile application, ensuring a reliable user experience. Postman was employed for testing APIs, and FastAPI was utilized for running the recommendation system. The database development for DynamoDB was easily set up with the features of VS Code that allowed the addition of libraries, extensions, and packages. Lastly, the mobile application was evaluated using the ISO 25010 evaluation instrument.

The related studies emphasized the importance of developing a mobile application to help students and donors in the scholarship and donation process. However, different algorithms were utilized.

Conceptual Model of the Study

The conceptual model of the study is depicted in Figure 1 using the Input-Process-Output diagram. This diagram gives an overview of the flow and the whole concept of the study.

ISKO NI JUAN MOBILE APPLICATION

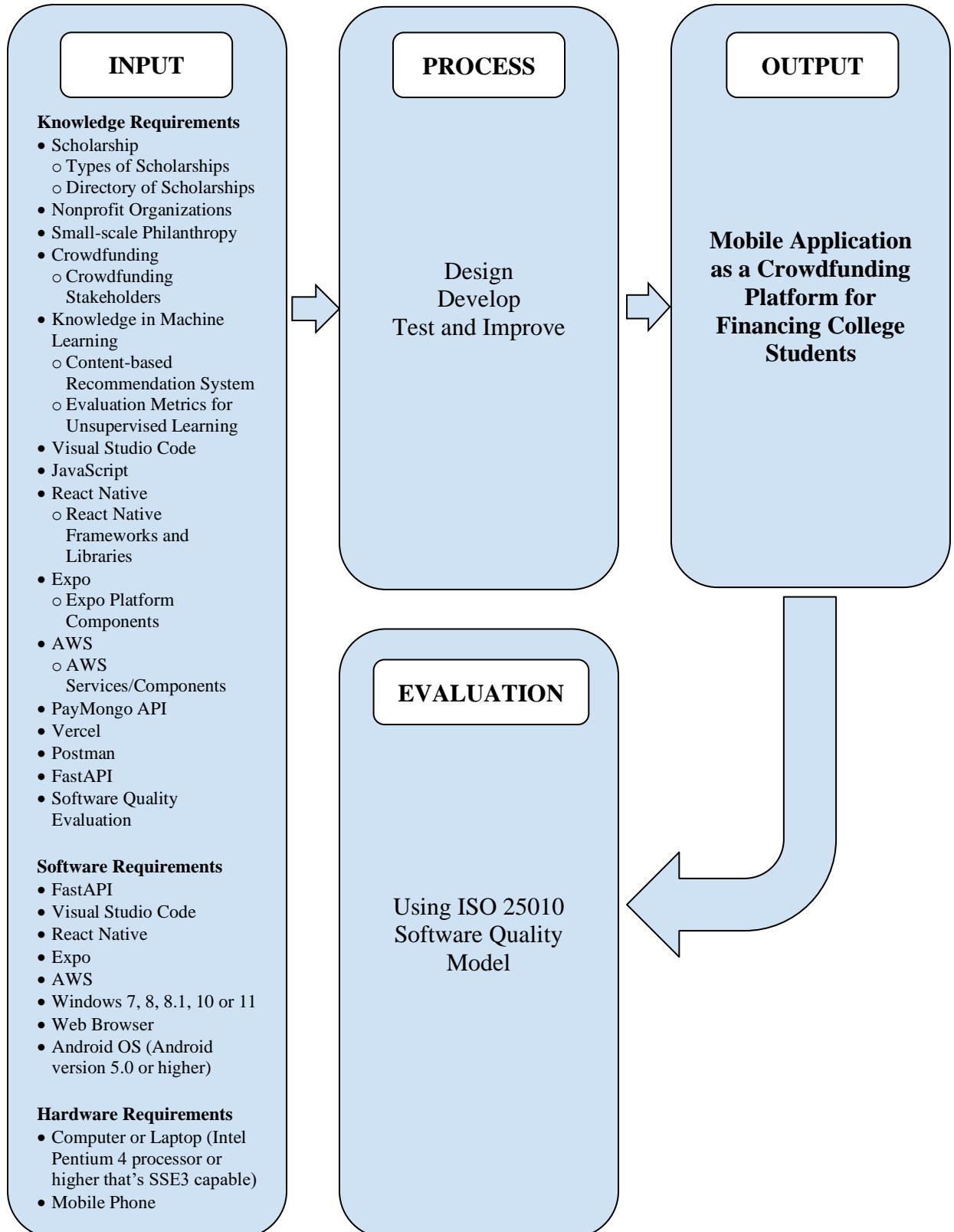


Figure 1. Conceptual Model of the Study

Input

The knowledge, software, and hardware required for the development of mobile application and content-based recommendation system are contained in the input block. The knowledge requirements are the concepts and facts that the researchers must understand and study in order to create a foundation for the study. These requirements include understanding of the concepts of Scholarship, Types of Scholarships, Importance and Impact of Scholarship, Directory of Scholarships, Nonprofit Organizations, Small-scale Philanthropy, Crowdfunding and Crowdfunding Stakeholders, Machine Learning specifically the Content-based Recommendation System and the Evaluation Metrics for Unsupervised Learning, Visual Studio Code, JavaScript, React Native and React Native Frameworks and Libraries, GraphQL, AWS and AWS Services/Components, PayMongo API, Vercel, Postman, FastAPI, and Software Quality Evaluation (ISO 25010) in order to assess the acceptability of the study. The software requirements for developing machine learning for scholar and philanthropist recommendation include application programs, programming languages, frameworks, and operating systems. The hardware requirements are the tools needed in creating the mobile application, such as mobile phone and personal computer or laptop.

Process

The process block includes designing, developing, and testing activities to develop the mobile application.

Design. In this phase, the researchers created the block diagram for the mobile application which serves as the model of the mobile application. The researchers also

prepared a use case diagram that specifies the expected functionalities of the mobile application where the external users can interact. By detailing each element and the flow of interaction between the user, mobile application, and recommendation system, the use case diagram acts as a model for efficiently communicating the system's behavior in the user's terms.

Develop. In the development phase, the construction of both the mobile application and the recommendation system took place. The mobile application was built using the AWS Amplify framework, React Native, and JavaScript in the Visual Studio Code IDE. Concurrently, a content-based recommendation system, designed with machine learning techniques and knowledge requirements, was developed and integrated into the application to ensure a smooth user experience. Amazon's DynamoDB served as the app's database, storing user data and recommendation metadata accessible by the mobile application. To handle the application's financial transactions, the PayMongo API was integrated, streamlining the crowdfunding process. The outcome of this phase was a fully developed mobile application complete with an integrated recommendation system.

Test. After the development, the developed mobile application together with the recommendation system should undergo tests to identify the overall functionality and accuracy in facilitating the crowdfunding. Fine-tuning of the system is necessary to ensure the accuracy of the recommendation system and functionality of the system before subjecting it to evaluation.

Evaluation

The evaluation block contains the evaluation system needed to satisfy the different needs of the stakeholders. The ISO 25010 assessment tool was used to examine the mobile application's applicability, efficiency, compatibility, usability, dependability, security, maintainability, and portability.

Output

In connection with the inputs and processes stated above, the output block shows the developed mobile application which was be subjected to evaluation to determine its Usability and Security.

Operational Definition of Terms

The following terminologies are defined for a better understanding the study:

Mobile Application refers to the software application designed to run on a mobile device, such as a smartphone or tablet, to allow students and philanthropists to connect and facilitate crowdfunding for academic expenses.

Student refers to the user of the mobile application seeking financial assistance or other forms of educational-related funding to cover academic expenses.

Philanthropist refers to the platform user who will contribute to a project by either monetary or nonmonetary. an individual or small-scale organization that provides financial assistance to students through the mobile application.

Campaign refers to the presentation of the project that will be launched on the mobile application.

View Campaign refers to the ability of the user to view the details of a created campaign on the platform.

Edit Campaign refers to the capability to make changes in the campaign on the platform.

Delete Campaign refers to the ability to remove a campaign from the platform.

Share Campaign refers to the ability to promote a campaign from the platform.

Donate refers to the ability of the philanthropists to provide something, such as money (monetary), or commodities (nonmonetary).

Monetary Donation refers to making financial donations.

Nonmonetary Donation refers to making donations that are not focused on money.

Swiper refers to the user who browses through the match tab of potential scholars or philanthropists.

Swipe refers to the act of using one's finger to slide across a mobile device's screen in order to express interest or disinterest in a potential match of scholars or philanthropists.

Swipee refers to the user who is being viewed by the swipers.

Merit-Based Scholarship refers to a specific kind of scholarship given to students who have shown academic excellence.

Context-Based Scholarship refers to a specific kind of scholarship given to students that considers the personal circumstances or background for qualification.

Need-Based Scholarship refers to a specific kind of scholarship given to students who needs financial aid.

Skills-Based Scholarship refers to a specific kind of scholarship given to students who excel in fields such as sports, arts, music, writing, or any other skill or talent.

Recommendation System refers to a machine learning algorithm, specifically a content-based recommendation system using mobileBERT, which suggests campaigns to the user based on his/her historical preference.

Scholarship Directory refers to the section of the mobile application that contains a list of scholarships given by different organizations, where students can apply for scholarships that the organizations offer, and leave comments about the scholarships given by the organizations to give insight to other students interested in applying for the scholarship.

Payment Gateway refers to the financial service that provides a secure connection between the student and the philanthropist to transfer funds using their credit/debit card, Online Banking, E-Wallets, and Over-the Counter Payments, integrated into the mobile application, specifically the PayMongo API.

Tertiary education refers to formal education programs and courses offered by universities, colleges, and other higher education institutions, designed to provide advanced knowledge, skills, and qualifications beyond secondary education.

Chapter 3

METHODOLOGY

This chapter entails the research methodology of the study with the following sections: project design, project development, operation and testing procedure, and evaluation procedure.

Project Design

The study developed a mobile application that served as a crowdfunding platform, designed to assist students in finding scholarships or other forms of financial aid to cover academic expenses. The study utilized several modeling tools to analyze the mobile application's scope and requirements as a map or guide for project development.

System Design

The model was represented through a block diagram, as depicted in Figure 2. This diagram illustrates the components necessary to build the infrastructure of the mobile application and the flow of interaction between the mobile app, the AWS cloud provider, and Vercel.

The mobile application primarily utilized Amazon Web Services (AWS), with AWS Amplify serving as the backbone of other cloud services. Amazon SNS, a cloud messaging service, provided a one-time code for user registration, while Amazon Cognito acted as an identity provider for the user. AWS AppSync, a managed service that used GraphQL, enabled the mobile application to fetch, manipulate, and subscribe to data from the server.

It simplified the application development process by letting developers create a flexible API for securely accessing, manipulating, and combining data from one or more data sources. AWS AppSync was closely integrated with AWS DynamoDB, a serverless database, where the user data was stored. This integration allowed for real-time data access.

To enhance the mobile application's functionality, Vercel was integrated into the system design. Vercel hosted the API for the list of Directory of Scholarship in the Philippines. The mobile app utilized this API to fetch the list of directories and displayed it to the users. Vercel provided a reliable hosting platform for the API, ensuring its availability and scalability.

The API Gateway, an integral part of the system infrastructure, served as an entry point for the Paymongo webhook, which was configured to only send successful payment transactions. This ensured that only valid and completed transactions were processed further. Upon receiving successful payment notifications from the PayMongo webhook, the API Gateway routed these to AWS Lambda. AWS Lambda, a serverless computing service, then tracked the donations through event-driven computing and hosted the machine learning recommendation system.

For storing the uploaded images of users, the mobile application utilized Amazon S3, a cloud storage provider. Amazon S3 provided a secure and scalable solution for storing and retrieving user images.

Lastly, Amazon Elastic Container Registry (ECR) stored Docker container images, specifically the Dockerfile that contained the FastAPI code for the recommendation system. ECR integrated with Amazon Lambda to deploy the recommendation system, enabling efficient scaling and management of the containerized application.

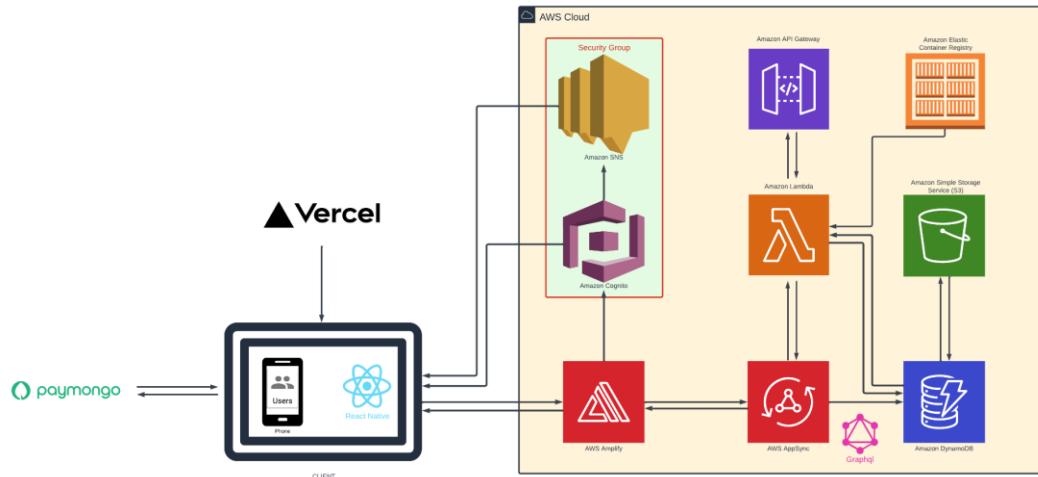


Figure 2. Block Diagram of Isko ni Juan Mobile Application

Software Design

The scope of the mobile application's software is represented through Use Case Diagram, as depicted in Figure 3. The diagram shows the external entities such as students/scholars, philanthropists, and university that all interact with the mobile application. This diagram specifies the expected behavior, functionalities, and requirements of the software.

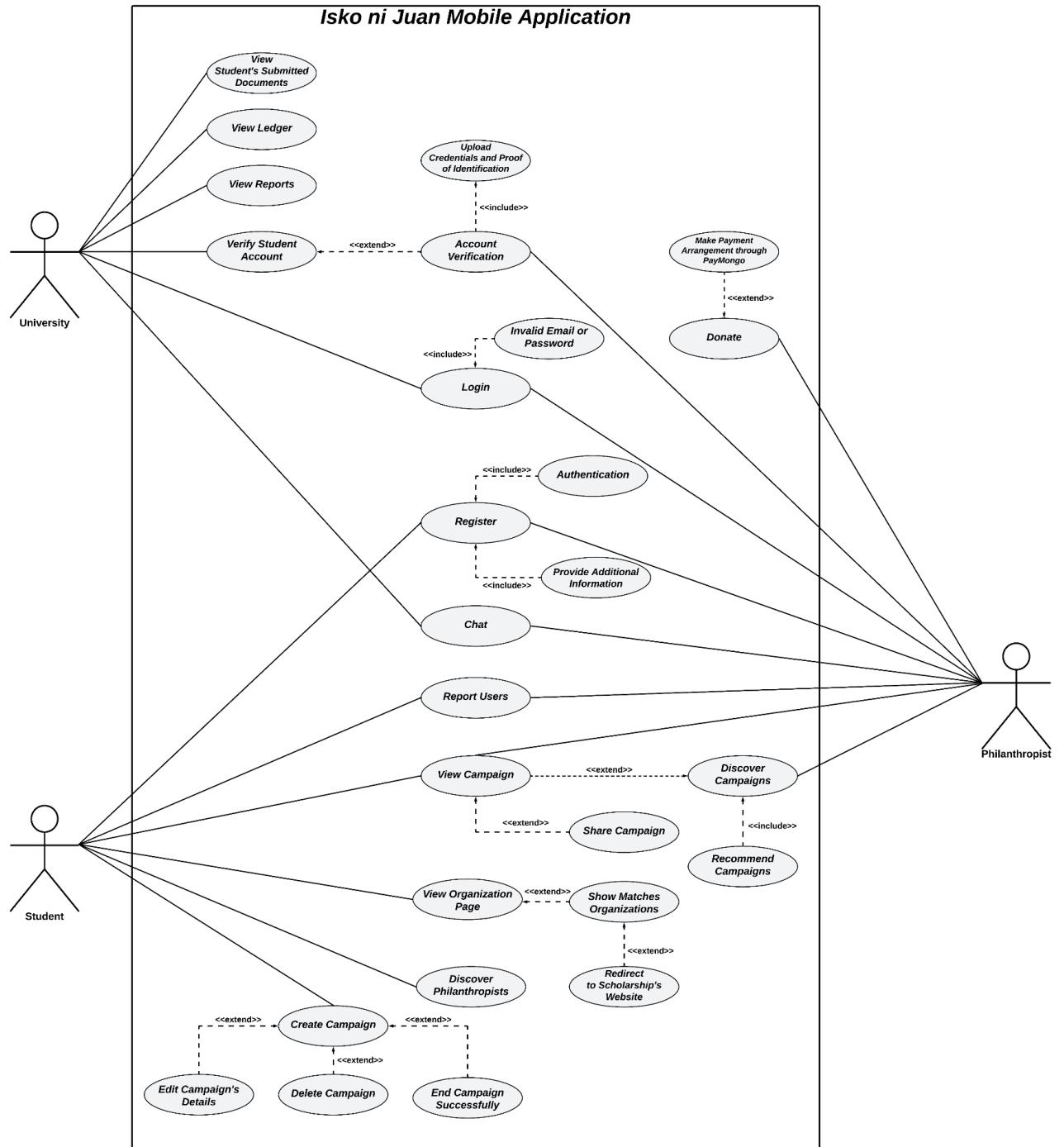


Figure 3. Use Case Diagram of Isko ni Juan Mobile Application

Based on system software requirements, the following are the features of the mobile application designed for the Student:

- Student Registration
- Upload Credentials and Proof of Identification
- Student Login
- Create Campaign
- Edit Campaign Details
- End Campaign Successfully
- Delete Campaign
- View Campaign
- View Organization Section
- Discover Philanthropists
- Chat with Philanthropists
- Report User

On the other hand, the following are the features of the mobile application designed for the Philanthropist:

- Philanthropist Registration
- Upload Credentials and Proof of Identification
- Philanthropist Login
- Create Campaign
- View Campaign

- Share Campaign
- Discover Scholars
- Recommend Scholar Campaigns
- Chat with Scholars
- Donate
- Report User

Furthermore, the following are the features of the mobile application designed for University:

- University Login
- Chat with Students
- View the Submitted Documents of Students for Account Verification
- Verify the Identity of Students
- View the Reports of Donations and Campaigns
- View the Ledger That Allows the University to Keep Track of All the Donations

Database Design

The scope of information maintained in the system is illustrated using an entity relationship diagram (ERD), as shown in Figure 4. The ERD shows two (2) primary user types consisting of the scholar, and the philanthropist. The secondary user type is the university. The university user type does not use all of the fields in “User” table. Every entity plays an essential role in the system. Every user will be categorized based on his/her user type. The scholar includes additional information that will be used for verification.

Characteristics are also added for the scholar and philanthropist user types, which include their geolocations, interests, ethnicity, and other identifying features. The philanthropist and university can chat with the student. The philanthropist can also donate to a student monetarily, students can access the directory of scholarships offered by private and public organizations, and university has a specific functionality in verifying the information uploaded by the students.



Figure 4. Database Design of Isko ni Juan Mobile Application

Project Development

This section discusses the procedures followed on how the mobile application was developed based on the design specifications.

Database Setup

Based on the database design of the system in Figure 4, the algorithm for the equivalent NoSQL Document Model for storing and retrieving data in DynamoDB included the following steps:

1. Set up and added data modeling in AWS Amplify to define the schema for the data.
2. Created tables for Scholar, Philanthropist, User, Organization, Campaign, Swipes, Additional Information, Scholar Information, Philanthropist Information, Donation, Chat Room, and Messages in DynamoDB. The necessary field names and types of the fields were inputted based on the design shown in Figure 4.
3. Saved and deployed the data model, and copied the generated GraphQL schema.
4. Added a GraphQL API and included the generated GraphQL schema into the local backend resources. The provisioned resources were then deployed in the cloud.
5. Accessed AWS AppSync, which allowed querying, updating, and publishing data in DynamoDB based on the defined schema.

Program Coding

The algorithm for the Machine Learning Recommendation System included the following steps:

1. The FastAPI application was initialized, and CORS middleware was added to allow requests from any origin.
2. A connection to AWS DynamoDB was created, and a table called "Campaign" was accessed. All items from this table were retrieved, and specific fields (id, campaignName, and description) were stored in a Python list.
3. The MobileBERT tokenizer and model were loaded. MobileBERT, a smaller and faster version of the BERT model, was utilized for tasks involving understanding the semantic meaning of text.
4. The campaign descriptions were tokenized and passed through the MobileBERT model to generate embeddings. These embeddings represented high-dimensional representations of the text, capturing the semantic meaning in a format understandable by machine learning models.
5. The cosine similarity between every pair of campaign descriptions was calculated using their embeddings. This resulted in a matrix where the entry at position (i, j) represented the cosine similarity between campaign i and campaign j.
6. A function called “get_similar_campaigns” was defined. This function took a campaign name and the cosine similarity matrix as input. It located the campaign in the data, determined its index, and retrieved the 10 most similar campaigns from the cosine similarity matrix. These similar campaigns were returned as a list of dictionaries.

7. An API endpoint was defined at /recommend, which accepted a campaign name as a query parameter. This endpoint called the “get_similar_campaigns” function with the provided campaign name and returned the resulting list of similar campaigns.

The mobile application was created using React Native with AWS Amplify, AppSync, Cognito, DynamoDB, S3, SNS, ECR, API Gateway, and Lambda. The following steps were followed to develop the mobile app:

1. AWS Amplify was initialized to integrate and set up the Amplify SDK inside the React Native app.
2. The interface and functions for the React Native app were designed and coded.
3. A database schema and data flow diagram were designed.
4. All the necessary libraries, including React Native, AppSync, Cognito, DynamoDB, S3, SNS, ECR, API Gateway, SNS, and Amplify, were imported into the Visual Studio IDE.
5. A GraphQL API was added using AWS AppSync to easily build a data-driven React Native app with real-time capabilities and offline functionality.
6. If the user is a student, a list of philanthropists in the form of cards was displayed on the home page.
7. If the user is a philanthropist, a list of scholars in the form of cards was displayed on the home page.
8. If the student swipes right, the student applied to be a scholar of the philanthropist listed on the card.

9. If the scholar swipes left, the scholar did not submit an application to the philanthropist.
10. If the user is a scholar, there was an organization page where he/she could view the directory of organizations offering scholarships.
11. If the philanthropist swipes right, the philanthropist became eligible to donate to the student's campaign. This invoked the recommendation engine to analyze the swiped campaign.
12. If the user is a philanthropist, there was a recommended tab that showed campaigns. The recommended campaigns came from the recommendation system hosted on AWS Lambda. AWS Lambda retrieved the data from AWS DynamoDB.
13. If the philanthropist swipes left, the philanthropist was not eligible to donate to the student's campaign.

Operation and Testing Procedures

The following procedures were conducted to test the effectiveness of the recommendation system:

1. Integration Testing:
 - The connection of the Docker image of the recommendation system stored in AWS ECR, deployed as an AWS Lambda function, was tested to ensure real-time retrieval of campaign data from AWS DynamoDB.
 - The function URL on AWS Lambda was verified to ensure that it successfully fetched the response of the recommendation system.

2. Recommendation Testing:

- The effectiveness of the unsupervised learning algorithm in generating relevant scholar campaign recommendations was evaluated based on the similarity of the recommended campaigns.
- The relevance of the recommendations provided by the system was ensured by confirming that the users preferred campaigns suggested by the recommendation system over those not recommended.

3. Usability and User Experience Testing:

- The usability and user experience of the mobile application, specifically related to the recommended campaigns, were evaluated.
- The user interface, navigation, and ease of use of the recommended campaigns screen were tested.
- Users' feedback were collected to assess their satisfaction with the recommended campaigns and the overall functionality of the system.

4. Performance Testing:

- The performance of the recommendation system was assessed in terms of response time and effectiveness.

The following procedures were conducted to operate the mobile application for the scholar's account:

1. The application "Isko ni Juan" was opened using an Android device.
2. The scholar saw the onboarding page where he/she was prompted to sign in. The scholar inputted his/her credentials to access the mobile application.

3. Once the scholar has successfully signed in, the application guided him/her through the setup process for the profile. The initial step involved uploading a profile picture, followed by specifying his/her current location. Subsequently, he/she was prompted to indicate his/her interests, select his/her ethnicity, specify his/her field of study, and identify the type of scholarship they were looking for. Additionally, he/she was requested to provide the family's yearly income and employment status.
4. After the scholar has successfully set up his/her profile, he/she was redirected to the application where he/she could view or create a campaign. In order for the scholar to be able to see the philanthropists, he/she needs to create a campaign first. Following the creation of a campaign, the app displays the philanthropists, and the scholar could swipe right to demonstrate interest to be a scholar of the philanthropist shown or swipe left to show disinterest. At the base of the application, tabs are shown to the scholar, consisting of the following functionalities:
 - a. Home: This is the section where the scholar could view or create a campaign. He/She could swipe right if he/she wants to seek help from the currently displayed philanthropist or swipe left if he/she seeks to find other philanthropists. The scholar is able to see the philanthropists' name, age, and the kind of scholarship they offer.
 - b. Messages: This displays the list of philanthropists who also swiped right on the scholar. The functionalities of the Messages tab are:
 - Chat: This is the default communication method between the scholar and the philanthropist using text.

- Send Image: This is used if the scholar intends to send an image.
- c. Organizations: This is the section where scholars could find scholarships from different organizations.
 - d. Notifications: This is where the scholar receives notifications if the philanthropists swiped right on the scholar.
5. After tapping the profile icon located in the top right corner of the application, the scholar was redirected to the Profile page. The Profile page provided the following functionalities:
 - a. Verify Account: This is where the scholar could verify his/her account by submitting his/her student ID, COR image, filling up school information, and face scan image.
 - b. Overview: This is the section where the scholar could edit and display his/her summary of personal or professional information.
 - c. Personal Information: This is the section where the scholar could change his/her credentials:
 - Name
 - Phone Number
 - d. Change Password: The scholar has the option to change the password of his/her account.
 - e. Help and Support: If the scholar wishes to seek help or encounters any problems with the application, he/she could access the frequently asked questions section to find relevant information. If the question is not found,

he/she has the option to create a ticket that would be sent to the admins for assistance.

- f. Privacy Policy: This states the privacy policy that was applied to the application in securing the data and information of the users.
 - g. Terms and Conditions: This states the terms and conditions that the scholar agreed to when using the app.
 - h. About: This explains the purpose of the application.
 - i. Sign Out: The scholar logs out of the application.
6. After the scholar is done using the app, he/she could go to the Profile page and sign out.

The following procedures were done to operate the mobile application for the philanthropist's account:

1. The application "Isko ni Juan" was opened using an Android device.
2. The philanthropist saw the onboarding page where he/she was prompted to sign in. The philanthropist inputted his/her credentials to access the mobile application.
3. Once the philanthropist has successfully signed in, the application guided him/her through the setup process for his/her profile. The initial step involved uploading a profile picture, followed by specifying their current location. Subsequently, he/she was prompted to indicate his/her interests, select his/her ethnicity, specify his/her field of study, and identify the type of scholarship he/she was offering. Additionally, he/she was requested to provide his/her yearly income and employment status.

4. After the philanthropist has successfully set up his/her profile, he/she was redirected to the application where he/she was presented with a scholar. He/She has the option to swipe right if he/she wants to help the currently displayed scholar or swipe left to look for other scholars. The application also presented tabs at the bottom for navigation purposes, consisting of the following functionalities:
 - a. Home: This is the section where the philanthropist could view campaigns and recommended campaigns. He/She has the option to swipe right if he/she is interested in donating to the currently displayed campaign or swipe left if he/she is not interested. The philanthropist is able to see the scholar's name, the start date of the campaign, campaign name, description, current donation, and amount goal.
 - b. Messages: This displays the list of scholars who also swiped right on the philanthropist. The following are the functionalities of the Messages tab:
 - Chat: This is the default communication method between the scholar and the philanthropist using text.
 - Send Image: This is used if the philanthropist intends to send an image.
 - c. Match: This displays the philanthropist's liked campaigns and allows him/her to view successful campaigns of different scholars.
 - d. Liked Campaign: This provides information about the campaign. The following are the functionalities of the Liked Campaign:
 - e. Donate: This is used if the philanthropist intends to send a monetary donation to the campaign.

- f. Share: This is used if the philanthropist intends to share the campaign.
 - g. Successful Campaigns: This displays a list of successful stories that have been completed.
 - h. Notifications: This is the section where the philanthropist receives notifications if the scholar swiped right on him/her.
5. After tapping the profile icon located in the top right corner of the application, the philanthropist was redirected to the profile page. The profile page provides the following functionalities:
- a. Verify Account: This is the section where the philanthropist could verify his/her account by submitting his/her valid ID and face scan image.
 - b. Overview: This is the section where the philanthropist could edit and display his/her summary of personal or professional information.
 - c. Personal Information: This is the section where the philanthropist could change his/her credentials:
 - Name
 - Phone Number
 - d. Change Password: The philanthropist has the option to change the password of his/her account.
 - e. Help and Support: If the philanthropist wishes to seek help or encounters any problems with the application, he/she could access the frequently asked questions section to find relevant information. If the question was not found, he/she has the option to create a ticket that would be sent to the admins for assistance.

- f. Privacy Policy: This states the privacy policy that was applied to the application in securing the data and information of the users.
 - g. Terms and Conditions: This states the terms and conditions that the philanthropist agreed to when using the app.
 - h. About: This explains the purpose of the application.
 - i. Sign Out: The philanthropist logs out of the application.
6. After the philanthropist is done using the app, he/she could go to the Profile page and sign out.

The following procedures were undertaken to operate the mobile application for the university's account:

- 1. The application "Isko ni Juan" was opened using an Android device.
- 2. The university saw the onboarding page where it was prompted to sign in. The university inputted its credentials to access the mobile application.
- 3. Once the university has successfully signed in, it was redirected to the dashboard where they could see the list of students who had signed up on the application and are studying at the university.
- 4. The university has the option to chat with the students or verify their enrollment status based on the information provided by the students on the mobile application.
- 5. After tapping the profile icon located in the top right corner of the application, the university was redirected to the profile page. The profile page provides the following functionalities:

- a. Change Password: The university has the option to change the password of its account.
 - b. Help and Support: If the university wishes to seek help or encounters any problems with the application, it could access the frequently asked questions section to find relevant information. If the question was not found, it has the option to create a ticket that would be sent to the admins for assistance.
 - c. Privacy Policy: This states the privacy policy that was applied to the application in securing the data and information of the users.
 - d. Terms and Conditions: This states the terms and conditions that the university agreed to when using the app.
 - e. About: This explains the purpose of the application.
 - f. Sign Out: The university logs out of the application.
6. After the university is done using the app, it could go to the Profile page and sign out.

The testing procedures conducted on the mobile application, in terms of usability and security, are shown in Tables 1 and Table 2, respectively. The primary objective of this study was to evaluate the effectiveness and viability of a mobile application designed to facilitate and streamline the process of acquiring educational funds for tertiary level students, addressing the pressing issue of the need for educational funds. To gauge the usability and security aspects of the mobile application, a series of rigorous testing procedures were implemented. These tests aimed to compare the actual results obtained during the testing phase with the expected results envisioned during the development phase. By scrutinizing the performance of the mobile application in relation to the expected outcomes, the researchers sought to assess its overall functionality and determine if it operates as intended.

The usability testing involved evaluating how easily and efficiently users could navigate through the mobile application's interface and access the various features and functionalities. The researchers assessed factors such as intuitiveness, user-friendliness, responsiveness, and ease of understanding.

Additionally, the security testing aimed to ensure that the mobile application was fortified against potential vulnerabilities and threats. This phase involved conducting rigorous assessments of the application's security protocols, encryption methods, data handling practices, and overall resilience to external attacks. By subjecting the mobile application to simulated real-world security scenarios, the researchers aimed to identify any weaknesses or potential risks that may compromise the privacy and security of the users' educational fund-related information.

Table 1.*Usability Testing Procedure of the Mobile Application*

Test Case	Steps Undertaken	Expected Results	Types
Sign Up Process	<ol style="list-style-type: none"> 1. Open the application <i>Isko ni Juan</i> using an Android device. 2. Click on Sign Up button. 3. Select user role. 4. Fill out the required fields: Name, Email Address, and Password. 5. Fill out Additional Information fields. 6. Enter phone number. 7. Verify phone number. 	- The user will successfully create an account that may be used to sign-in the app. The user can use the different functionalities in the mobile application, such as home/match screen, chat screen, campaigns, notifications, and profile screen.	Learnability
Campaign Creation	<ol style="list-style-type: none"> 1. Click on the create campaign button. 2. Fill out the required fields: Campaign Title, Description, Funding Goal. 3. Upload an image for the campaign. 4. Click on Create Campaign button. 	- The user will successfully create a campaign that philanthropists can donate to. The user can also browse and pick the philanthropist of his/her choice.	Learnability
Donation process	<ol style="list-style-type: none"> 1. Click on the Donate button for a campaign. 2. Select a donation amount. 3. Click on Pay and Confirm button. 4. Select a payment method. 5. Fill out Billing Details. 	- The user will successfully donate to the campaign of the scholar. The donation will reflect on the donation count of the campaign on the view of all users.	Operability
User Profile	<ol style="list-style-type: none"> 1. Click on User Profile icon. 2. View user details. 3. Edit user details if desired. 	- The user will be able to change the credential that he/she need to change, such as changing name, phone number, or email address.	Appropriateness
Navigation	<ol style="list-style-type: none"> 1. Click on each navigation button: Home, Messaging, Liked Campaigns, Notifications. 2. Navigate back to Home. 	- Clicking on the “Home” button should take the user to the home screen where the user can like campaigns or philanthropists.	Operability

Test Case	Steps Undertaken	Expected Results	Types
Campaign Details	<ol style="list-style-type: none"> 1. Click on a campaign to view details. 2. Read through the project description, funding goal. 3. Click on the Back icon to return to the previous page. 	<ul style="list-style-type: none"> - Clicking on the "Chat" button should open the messaging or chat screen, allowing the user to communicate with other users. - Clicking on the "Heart" button should display a list of campaigns that the user has liked. - Clicking on the "Notifications" button should show relevant notifications or updates. 	
Social Sharing	<ol style="list-style-type: none"> 1. Click on the Share button for a campaign. 2. Click on a social sharing button for a campaign (e.g. Facebook, Twitter, Instagram). 3. Share the campaign on the selected social media platform. 	<ul style="list-style-type: none"> - The user will be able to view the full details of the campaign created by the particular scholar. - The user will be able to navigate back if he/she is done reading the details of the campaign. 	Appropriateness
Notifications	<ol style="list-style-type: none"> 1. Click on the Notifications icon. 2. View all notifications. 3. Mark a notification as read. 	<ul style="list-style-type: none"> - The user will be able to view the different updates such as a philanthropist wanting to help in a campaign or a scholar seeking help for his/her campaign. 	Operability

Table 2.*Security Testing Procedure of the Mobile Application*

Test Case	Steps Undertaken	Expected Results	Types
Login Authentication	<ol style="list-style-type: none"> 1. Attempt to login with invalid credentials. 2. Attempt to login with valid credentials. 	<ul style="list-style-type: none"> - The user will be able to receive an alert “User does not exist.” for signing in with wrong credentials. - The user will be able to proceed to the home screen by using valid credentials. 	Authenticity
Password Strength	<ol style="list-style-type: none"> 1. Attempt to set a weak password. 2. Attempt to set a strong password. 	<ul style="list-style-type: none"> - The user will be able to receive an alert “Password Strength: Weak.” when entering a password not including lowercase letters, uppercase letters, and numbers while signing up. - The user will be able to receive an alert “Password Strength: Strong” when entering a password consisting of lowercase letters, upper-case letters, and numbers while signing up. 	Accountability
Privacy Protection	<ol style="list-style-type: none"> 1. Attempt to access another user’s data. 2. Ensure user data are stored securely. 	<ul style="list-style-type: none"> - Users who will attempt to access other data will need authentication, which bars unauthorized users from accessing the data of other users. 	Confidentiality
Authorization and Access	<ol style="list-style-type: none"> 1. Attempt to access restricted functionality. 2. Grant access to authorized user only. 	<ul style="list-style-type: none"> - The user will receive an alert “Incorrect username or password” for signing in with wrong credentials. - The user will proceed to the home screen by using valid credentials. 	Authentication and Accountability

Test Case	Steps Undertaken	Expected Results	Types
Password Recovery	<ol style="list-style-type: none"> 1. Attempt to recover password without proper authentication. 2. Attempt to recover password with proper authentication. 	<ul style="list-style-type: none"> - Users who will attempt to recover a password without proper authentication will not be granted any permission to recover the password. - Users who will recover a password using proper authentication will be granted permission to change their old password. 	Authentication
Error Handling	<ol style="list-style-type: none"> 1. Test how the application handles errors, such as incorrect login credentials or server errors. 	<ul style="list-style-type: none"> - Errors should be handled with alert messages. If the user entered wrong login credentials, the alert should state that the “User does not exist” or “Incorrect Password”. For the server errors, the app should display error messages pertaining to issues with the server which encourages the users to try again later. 	Integrity

Evaluation Procedure

The evaluation instrument that was used to assess the acceptability of the system was adapted from the ISO 25010 titled “Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models.”

The following procedures were conducted to evaluate the acceptability of the developed mobile application:

1. Purposively selected respondents composed of students, small-scale philanthropists, and developers were invited.
2. The mobile application was demonstrated and explained to the evaluators on how to operate it.
3. The evaluators were asked to try using the mobile application using different user profiles.
4. The evaluators were requested to evaluate the mobile application individually based on the given evaluation sheets using a 4-point Likert Scale shown in Table 3.
5. The accomplished evaluation sheets were processed, and the gathered data were tabulated in Microsoft Excel and weighted mean were computed.
6. The descriptions for the numerical ratings were determined using the range of weighted mean values shown in Table 3.

Table 3.*Range of Weighted Mean Values and Its Qualitative Interpretation*

Scale	Range	Qualitative Interpretation
4	3.26 – 4.00	Highly Acceptable
3	2.51 – 3.25	Very Acceptable
2	1.76 – 2.50	Acceptable
1	1.00 – 1.75	Not Acceptable

Chapter 4

RESULTS AND DISCUSSION

This chapter contains the project description, project structure, project capabilities and limitations, and results of evaluation for the project.

Project Description

The study developed a mobile application that provided a platform for small-scale philanthropy to support tertiary level students who needed financial assistance. This study also incorporated machine learning, specifically the content-based recommendation system, to recommend campaigns to philanthropists based on their preferences and campaign swipe history.



Figure 5. Home Screen

Project Structure

The project structure of the crowdfunding platform was designed to facilitate the fundraising efforts of students and philanthropists alike. The crowdfunding platform begins with an onboarding page, as shown in Figure 6. This initial step presents a succinct introduction to the app's purpose and key features, preparing new users for their journey within the app.

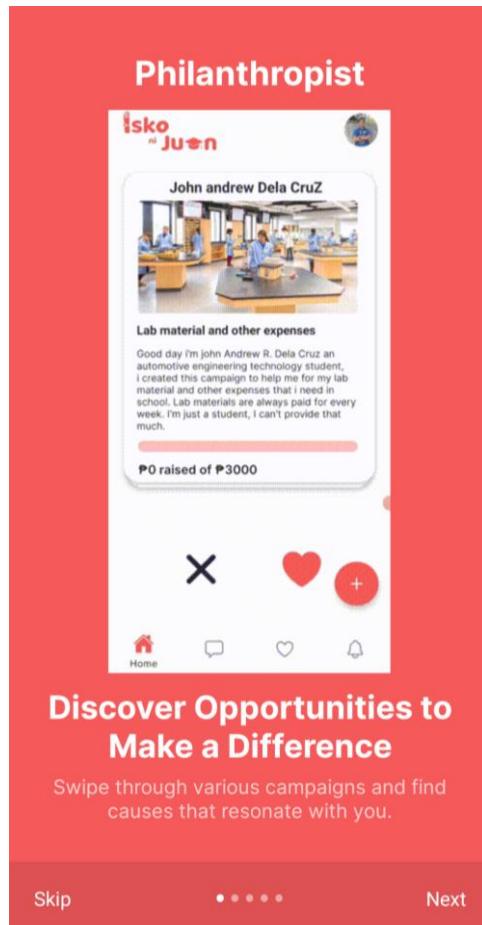


Figure 6. Onboarding Screen

Following the onboarding process, users are guided to a screen where they can either sign in if they already have an account, or sign up to create a new one. This process is depicted in Figure 7.



Figure 7. Welcome Screen

If the user does not have an account yet, he/she can easily create one and choose a role. Figure 8 displays the two (2) roles available for users: student and philanthropist. By registering for the appropriate role, the user will be able to access features that are specific to the user's needs.

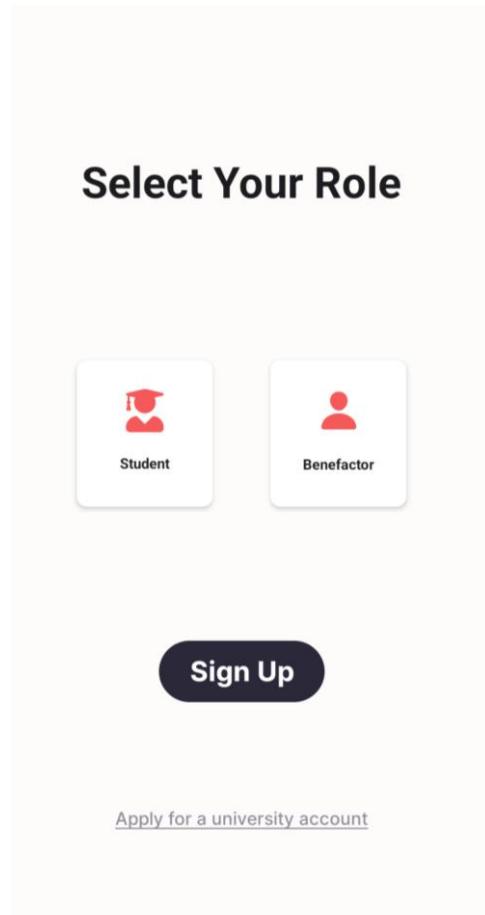
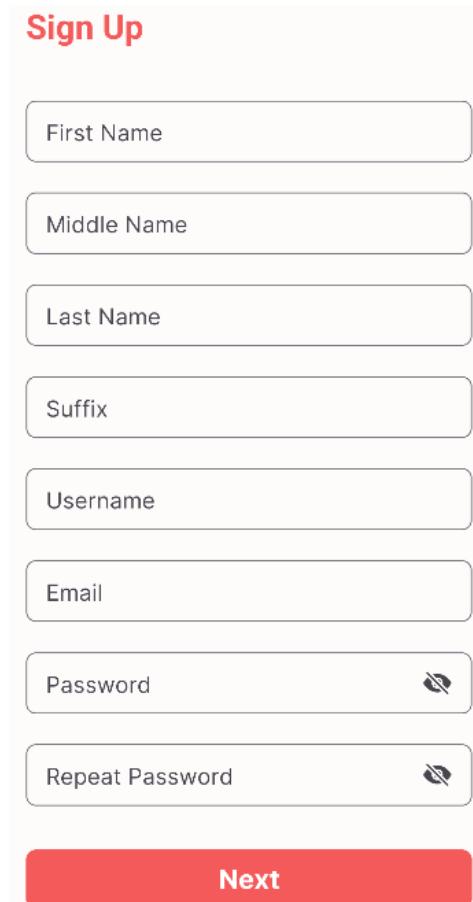


Figure 8. Selection of User Profile Upon Sign Up

If the user proceeds to create an account, he/she will be prompted to input his/her credentials on the different required fields. This will serve as the creation of the credentials of his/her account.



The image shows a mobile application's sign-up screen titled "Sign Up". It features eight input fields arranged vertically: "First Name", "Middle Name", "Last Name", "Suffix", "Username", "Email", "Password", and "Repeat Password". Each field is enclosed in a rounded rectangle. The "Password" and "Repeat Password" fields include small eye icon icons to toggle visibility. A large red "Next" button is positioned at the bottom of the screen.

Field	Description
First Name	Text input for the user's first name.
Middle Name	Text input for the user's middle name.
Last Name	Text input for the user's last name.
Suffix	Text input for the user's suffix.
Username	Text input for the user's chosen username.
Email	Text input for the user's email address.
Password	Text input for the user's password, with a visibility toggle icon.
Repeat Password	Text input for the user to repeat their password, with a visibility toggle icon.

Figure 9. Sign Up Fields

After filling out the various fields with the required credentials and verifying his/her phone number, the user will be directed to set up his/her account. This process involves following several steps. He/She will need to provide a range of information including a profile picture, location, interests, ethnicity, field of study, type of scholarship, yearly income, and employment status.

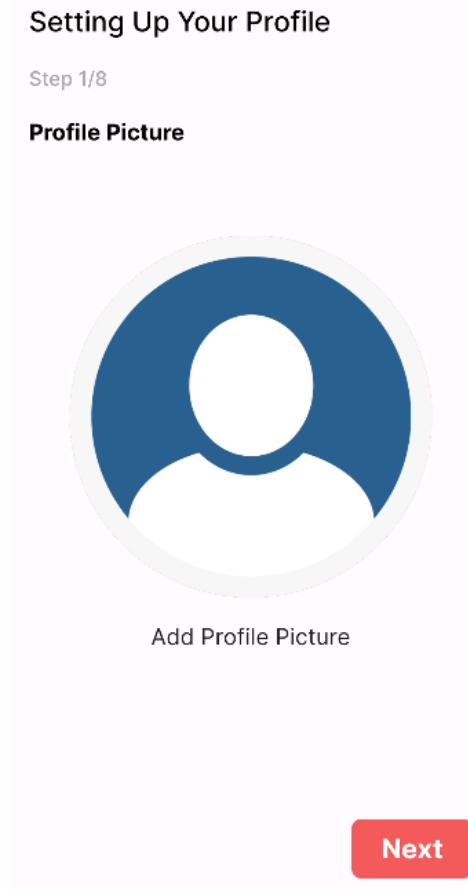


Figure 10. Setting Up Profile

The crowdfunding platform empowers students to highlight their academic achievements and fundraising campaigns by uploading pertinent credentials and documents. As depicted in Figure 11, the verification feature of the student interface ensures that users are bona fide students enrolled in tertiary level education programs. This feature mandates the upload of a student ID and registration certificate. Through validating these documents, the platform confirmed that only genuine students could create campaigns or apply for scholarships.

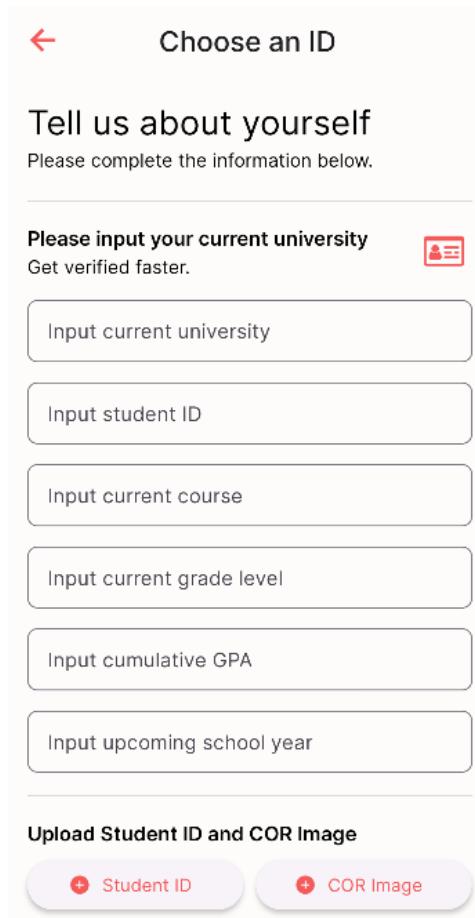


Figure 11. Student Verification Process

Figure 12 illustrates the face verification feature of the crowdfunding platform. This feature requires users to submit a photo of their face. If the user is a student, this photo is compared with the one on his/her student ID. Conversely, if the user is a philanthropist, the photo is compared with the one on the government-issued identification. By using facial recognition technology, the platform was able to verify the identities of users and prevent fraudulent activity. This feature helped build trust and confidence in the platform among both students and philanthropists, ensuring that donations are made by legitimate sources.

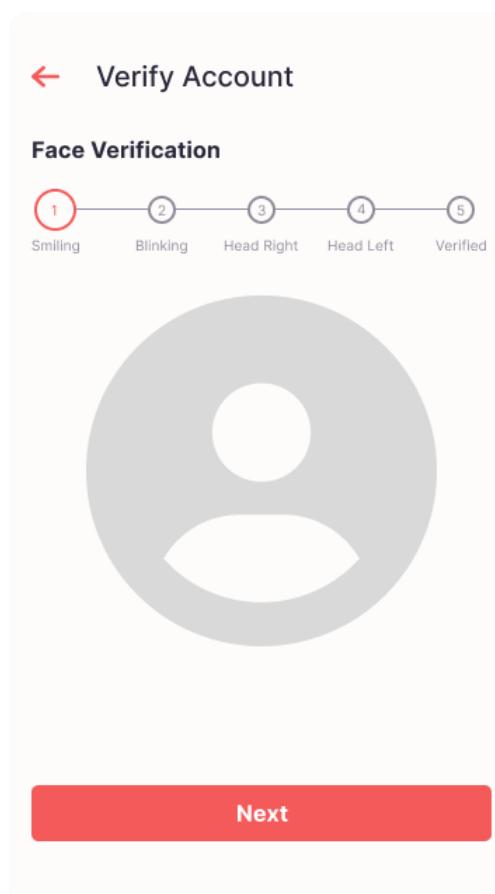


Figure 12. Face Verification

The ID verification feature, depicted in Figure 13, served as a security measure designed to restrict access and participation on the platform to verified users only. This feature requires users to submit a photo of their government-issued identification, such as a passport or driver's license. The platform then verifies the authenticity of the identification by comparing it to the information provided by the philanthropist during the registration process. By utilizing ID verification, the platform ensures that only legitimate philanthropists are able to make donations, helping to prevent fraud and ensures the integrity of the crowdfunding platform. This feature helped build trust and confidence in the platform among both students and philanthropists.

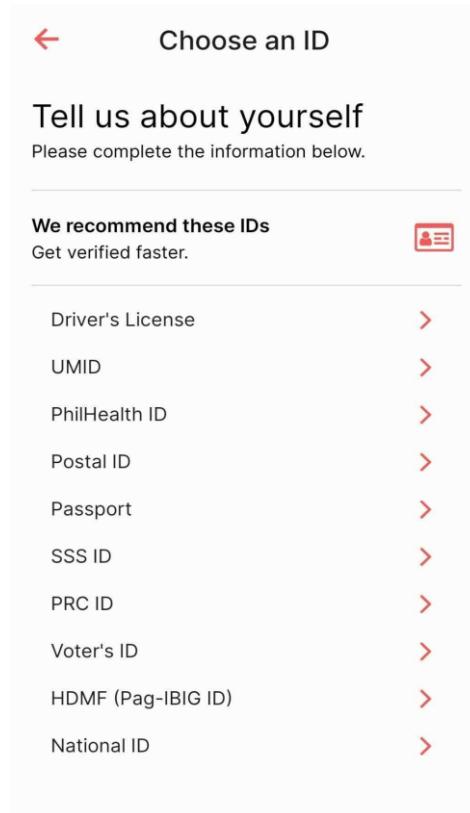


Figure 13. ID Verification

The crowdfunding platform was designed to empower students to raise funds for their academic and personal projects. As a result, students were the only users who are eligible to create campaigns and initiate fundraising efforts.

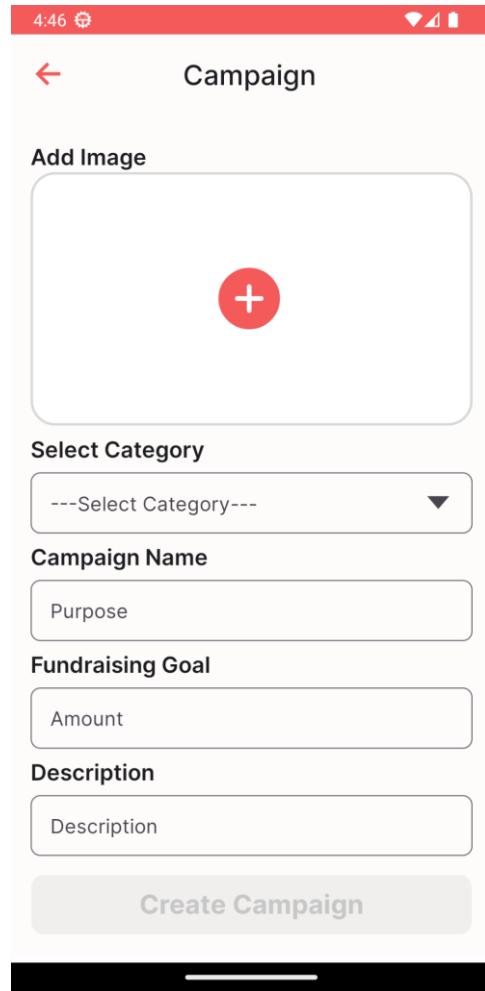


Figure 14. Campaign Creation

Each category will have a predetermined range of fundraising amounts, ensuring that students keep their goals within reasonable limits, and ensuring that the fundraising remains fair and balanced.

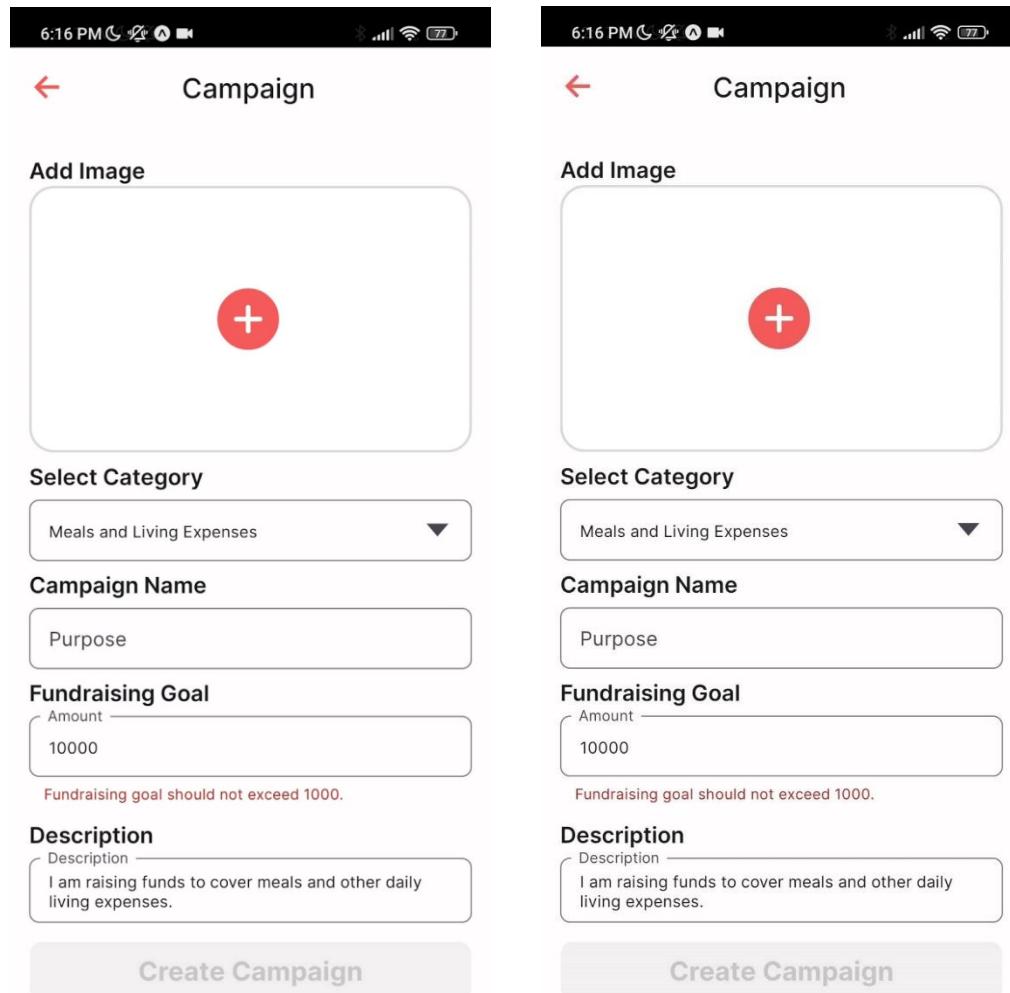


Figure 15. Fundraising Goal Limit

Once a student has created a campaign, he/she is then able to utilize a variety of features to manage and promote his/her fundraising efforts. Figure 16 displays the campaign management options, which included ‘Edit Campaign’, ‘End Campaign Successfully’, and ‘Delete Campaign.’

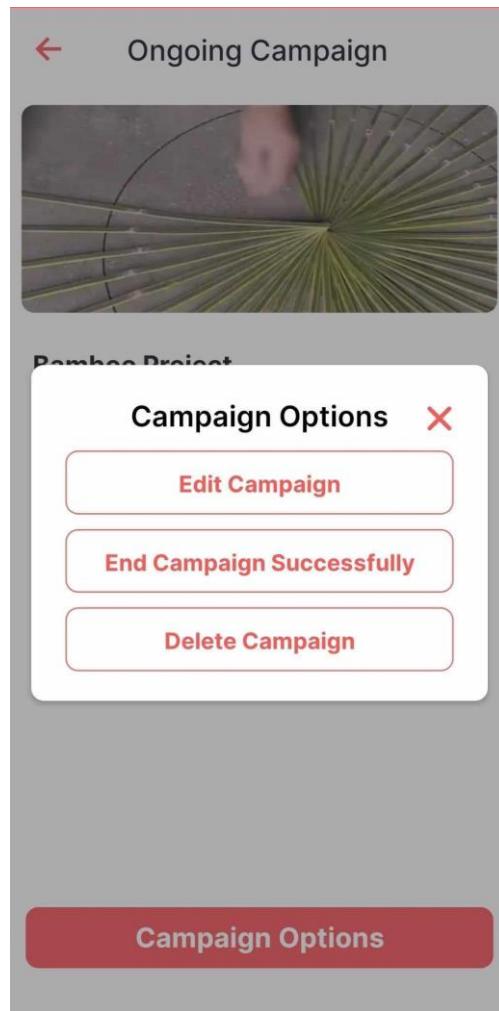


Figure 16. Campaign Management

In addition to crowdfunding features, there is also a directory of scholarships available in the Philippines, as shown in Figure 17. The scholarship directory served as a valuable resource for students, providing information about scholarships offered by non-profit organizations. Students could browse the directory and apply for scholarships that matched their qualifications and interests.

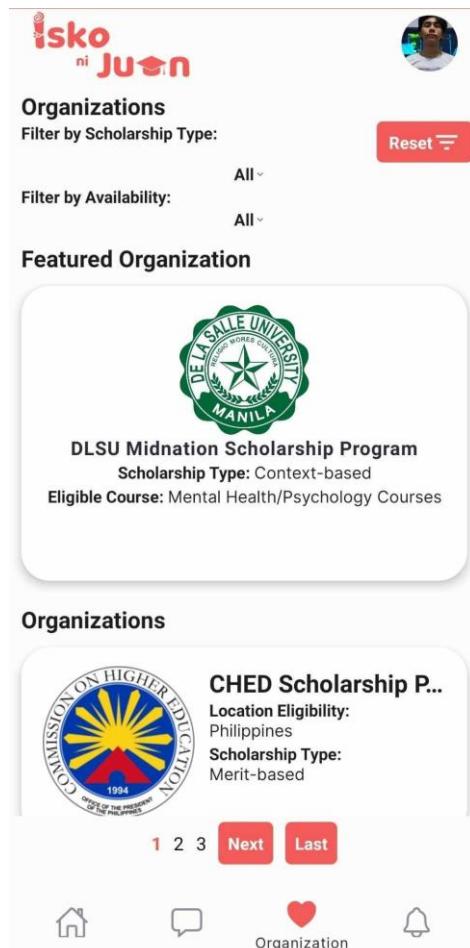


Figure 17. Scholarship Directory Screen

Once a student has selected a scholarship, detailed information about the scholarship program, such as eligibility requirements and selection criteria, is displayed as shown in Figure 18. This feature streamlined the scholarship application process for students by granting them access to a directory of non-profit organizations offering scholarships aligned with their qualifications and aspirations.

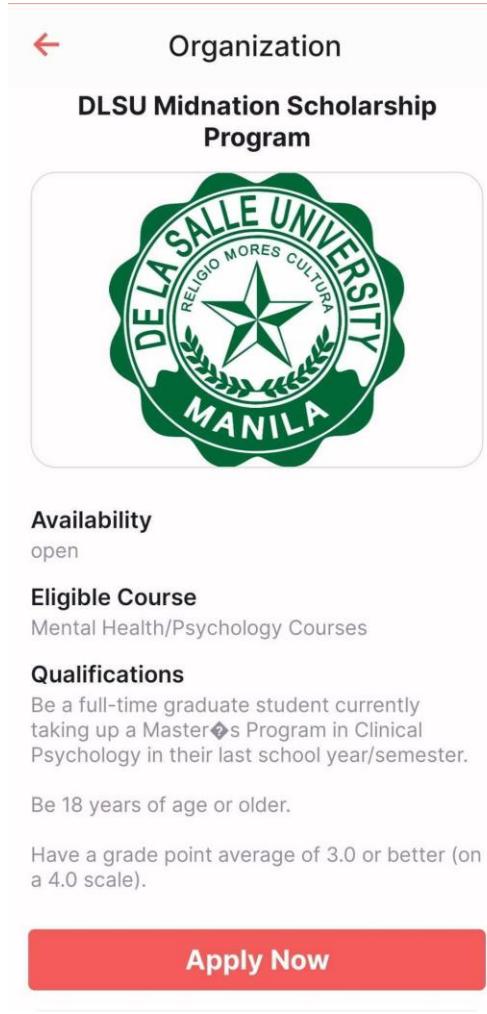


Figure 18. Detailed Information about the Scholarship

After a user has chosen a campaign or a scholarship to apply for, he/she is redirected to a chat or messaging feature. This allows him/her to communicate directly with the student running the campaign or the philanthropist offering the scholarship.

The chat/messaging feature on the student side of the crowdfunding platform enabled students to engage directly with philanthropists who expressed interest in their campaign. This feature allowed students to pose questions about the philanthropist's donation or provide updates on their campaign progress.

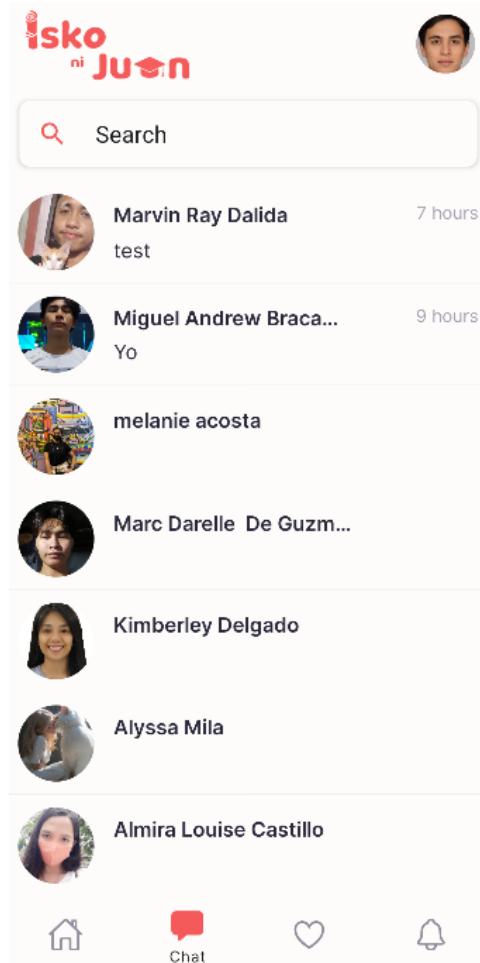


Figure 19. Chat Feature on Scholar Side

Similarly, Figure 20 showcases the chat/messaging feature on the philanthropist side of the crowdfunding mobile application. This feature enabled philanthropists to communicate directly with students who had launched a campaign on the platform. It provided a secure and convenient means for philanthropists to ask questions about the campaign or offer support and guidance to the students. Through this chat/messaging feature, philanthropists had the opportunity to learn more about the students' backgrounds, goals, and needs, and could provide personalized advice to foster their success.

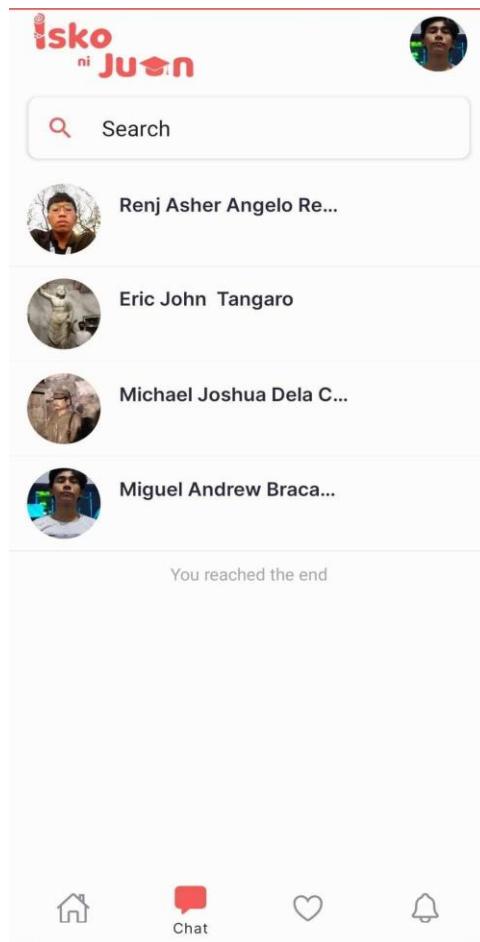


Figure 20. Chat Feature on Philanthropist Side

The “Liked Campaign” feature on the philanthropist side of the crowdfunding platform enabled philanthropists to easily view and manage campaigns they had ‘liked’ or shown interest in. This feature offered a convenient means for philanthropists to keep track of campaigns they might have considered supporting, thereby simplifying navigation of the platform and identification of opportunities to make a difference in the lives of tertiary level students. By utilizing this feature, philanthropists were able to review and compare campaigns side-by-side, determining which ones best aligned with their values and interests.

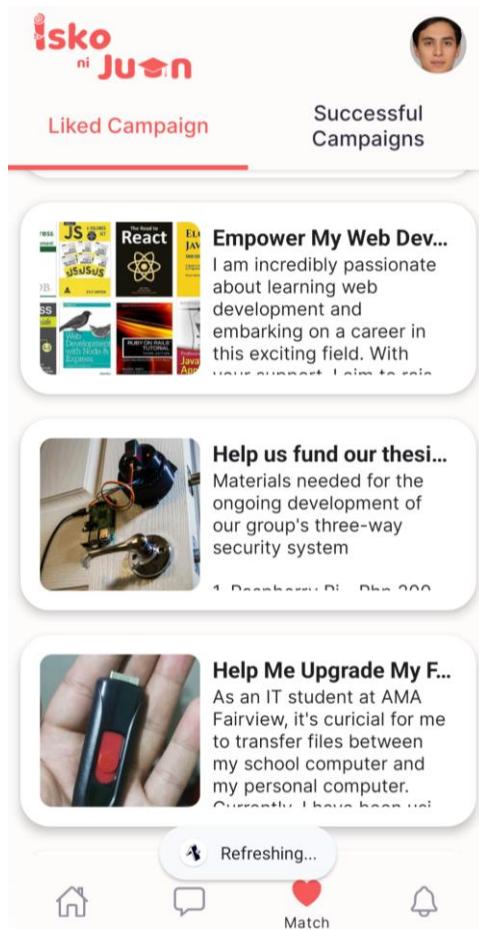


Figure 21. Liked Campaigns Screen

Figure 22 depicts the “Successful Campaigns” feature of the crowdfunding platform. This feature showcased stories of students who had successfully completed their education, thanks to the platform and the generosity of philanthropists. Through the “View Successful Campaigns” feature, philanthropists could witness the tangible impact of their contributions, which served as a source of motivation and inspiration.

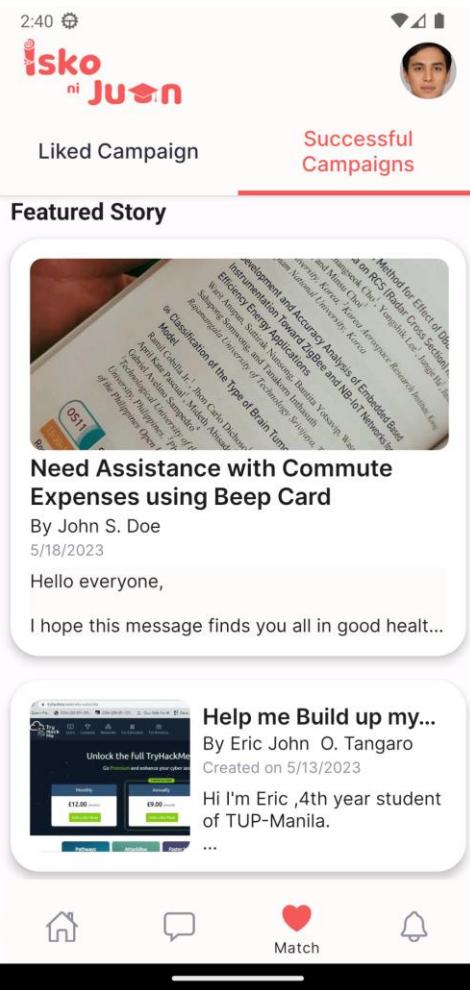


Figure 22. Successful Campaigns Screen

The notification feature displayed in Figure 23 on the student side of the crowdfunding platform was designed to keep students informed about significant updates concerning their campaigns or scholarship applications. When a student receives a new donation or a philanthropist shows interest in their campaign, he/she will be notified in real-time. Moreover, the notifications feature alerted students to new scholarship opportunities that matched their academic achievements and interests. By providing timely and relevant information, this feature assisted students in staying engaged with their campaigns and maximizing their chances of success in securing necessary funds for tertiary education.



Figure 23. Notifications Feature for Student

The notifications feature, displayed in Figure 24 on the philanthropist side of the crowdfunding platform, was designed to keep philanthropists informed about campaigns or scholars who aligned with their interests and preferences. This feature sent notifications to philanthropists when new campaigns or scholars, matching their chosen criteria, were added to the platform. Moreover, philanthropists could receive notifications about updates to campaigns or scholarships they had previously selected, such as when a student reaches his/her funding goal or when a scholarship deadline is approaching. This notification feature assisted in keeping philanthropists engaged and informed about opportunities to support tertiary education through the platform.



Figure 24. Notifications Feature for Philanthropist

The “Donate” feature on the philanthropist side of the crowdfunding platform, shown in Figure 25, allowed philanthropists to contribute financially to student campaigns. This feature provided a secure and convenient method for philanthropists to make donations, with options to choose the amount of the donation and the specific campaign they wished to support. Once a philanthropist makes a donation, he/she receives a confirmation message and a receipt for his/her records. The ‘Donate’ feature was a crucial aspect of the crowdfunding platform, as it enabled philanthropists to support tertiary level students and make a meaningful impact on their lives.

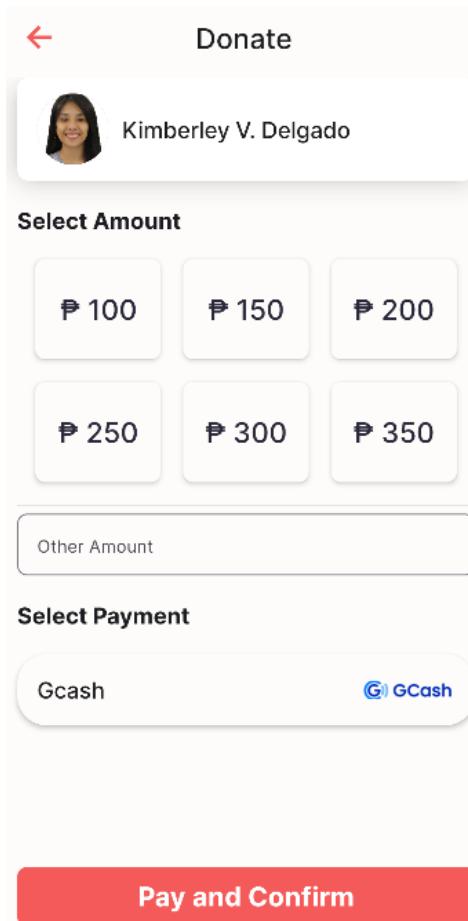


Figure 25. Donate Feature on Philanthropist Side

To further affirm the authenticity of the scholars, university accounts were able to verify students studying at their respective universities. As depicted in Figure 26, the university account displayed a list of students who had applied for account verification. The university representative could verify the scholar's credentials through the messaging function, allowing both the representative and the scholar to communicate and determine what needed to be accomplished prior to verification.

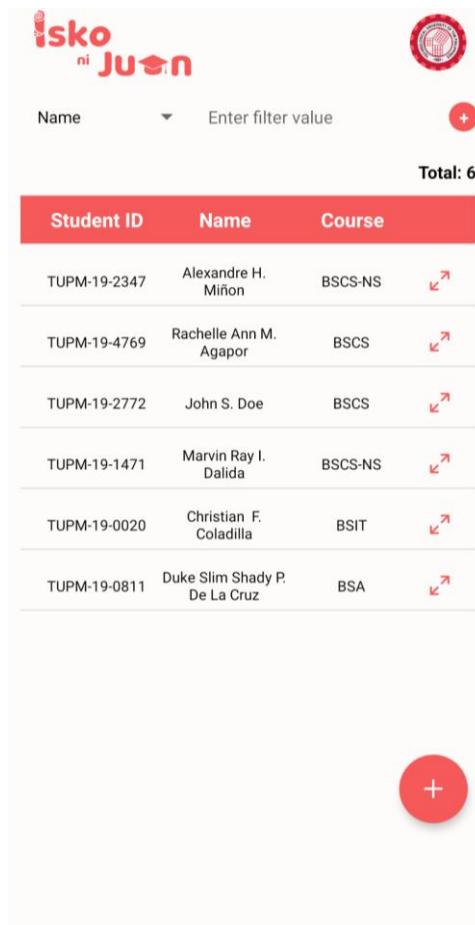


Figure 26. University Account View

The mobile application also included a dedicated reports screen for the university account. This screen provided users with a clear visual breakdown of ongoing campaigns, as illustrated in Figure 27. Insights were presented through intuitive pie charts and bar graphs. These graphical representations enabled users to easily comprehend the distribution and status of campaigns.

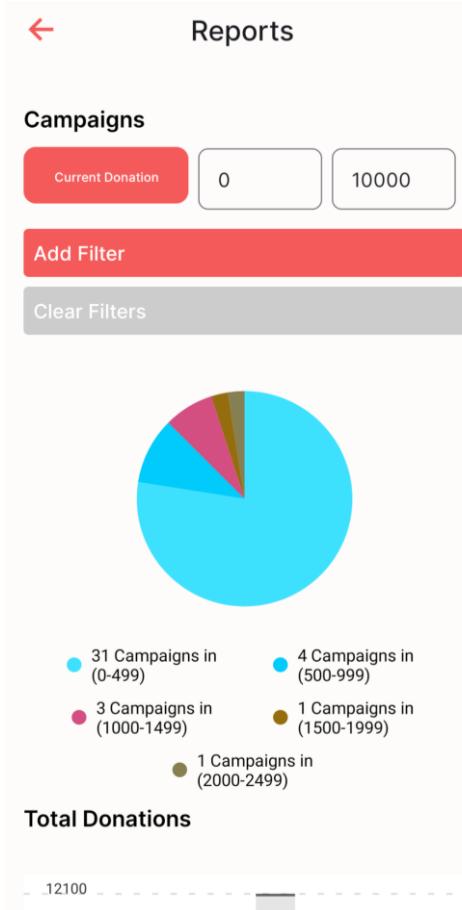


Figure 27. Reports/Data Visualization Screen

In addition to the reports screen, the mobile application offered a ledger screen, as depicted in Figure 28. This section serves as a record-keeping system for all donations made within the platform. It displays critical information such as the philanthropist's name, the amount donated, the date of the donation, and the specific campaign to which the donation was made. This comprehensive log provides a transparent view of all financial transactions, fostering trust and accountability within the crowdfunding community.

The screenshot shows a mobile application interface titled 'Ledger' at the top. Below the title are three buttons: 'Filter' (with a magnifying glass icon), 'Reset' (with a trash can icon), and 'View Summary' (with a bar chart icon). The main area is a table with the following data:

Amount	Philanthropist	Donated On	Action
1000	Carlo Pascual Dichoso	2023-05-01	⤒
100	Carlo Pascual Dichoso	2023-05-22	⤒
250	Hannah Padolina Liquiran	2023-05-22	⤒
1000	Trisha Obligar Garcia	2023-05-25	⤒
1000	Carlo Pascual Dichoso	2023-04-30	⤒
100	John Casera Bustamante	2023-05-28	⤒
250	Carlo Pascual Dichoso	2023-05-13	⤒
500	Hannah Padolina Liquiran	2023-05-21	⤒
1000	Carlo Pascual Dichoso	2023-05-05	⤒
100	Hannah Padolina Liquiran	2023-05-20	⤒
1000	Hannah Padolina Liquiran	2023-05-21	⤒
250	Hannah Padolina Liquiran	2023-05-21	⤒

Figure 28. Ledger Screen

After the completion of the verification process, the university representative verified the scholar. As seen in Figure 29, the verification mark was then displayed on the scholar's account, becoming visible to other users. This verified mark served as proof to philanthropists that the scholar had undergone the verification process, thereby affirming the scholar's authenticity.

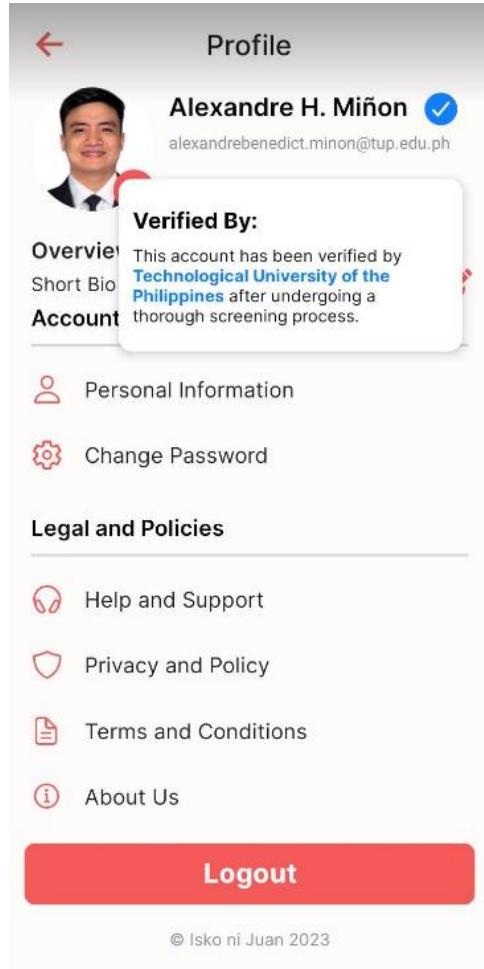


Figure 29. Verified Student Mark

Project Capabilities and Limitations

The following are the capabilities of the developed mobile application:

1. The project aimed to develop a mobile application that assisted students in finding scholarships or other forms of financial aid in the Philippines.
2. The mobile application also served as a crowdfunding platform for eligible students, connecting them with various philanthropists who are willing to help.
3. The application was capable of handling features such as creating and managing campaigns, applying for scholarships, sharing user experiences, leaving comments, and utilizing payment gateways for secure transactions for both students and philanthropists.
4. SMS notification was required upon user sign-up, and the upload of credentials such as ID and Certificate of Registration was necessary to achieve a verified checkmark. The uploaded images were processed and validated to ensure the authenticity of the user.
5. The project was developed natively for Android using React Native, making it accessible to a wide range of Android devices.
6. The application used machine learning for the recommendation system for recommending scholar campaigns to philanthropists.

The following are the limitations of the developed mobile application:

1. The application was limited to scholarships and educational-related funding; the creation of campaigns for other purposes was strongly prohibited in the application.
2. The communication between students and philanthropists was only limited to the Chat feature of the app; the development of Video Call and Call features was not included in the project.
3. The mobile application was only available for Android devices using at least version 5.0 of the Android Operating System.
4. The app was only available for Android; thus, the development of the application focused solely on Android and did not include iOS.
5. The implementation of push notifications was not included in the development of the application. Users did not receive push notifications for updates or important notifications.
6. The application was not responsible for communication that occurred outside the app. Any communication between users outside the app was not under the domain of the application.
7. The recommendation system for recommending philanthropist was not included in the development of the application.

Test Results

The developed mobile application was created using JavaScript programming language and React Native frameworks. As such, the mobile application can run on any Android operating system. The test results on the usability and security of the developed application are presented in the tables that follow.

Table 4.

Usability Test Results

Test Case	Steps Undertaken	Observed Results
(Learnability) Sign Up Process	<ol style="list-style-type: none"> 1. Open the application <i>Isko ni Juan</i> using an Android device. 2. Click on Sign Up button. 3. Select user role. 4. Fill out the required fields: Name, Email Address, and Password. 5. Click on Next button. 6. Enter phone number. 7. Verify phone number. 8. Fill out Additional Information fields. 9. Click on Start Funding button. 	The user successfully created an account that he/she can use to sign-in using the app. The user can use the different functionalities in the home/match screen, chat screen, campaigns, notifications, and profile screen. See Appendix B, Figure 30.
(Learnability) Campaign Creation	<ol style="list-style-type: none"> 1. Click on the create campaign button. 2. Fill out the required fields: Campaign Title, Description, Funding Goal. 3. Upload an image for the campaign. 4. Click on Create Campaign button. 	The user successfully created a campaign that philanthropists can donate to. The user can browse and pick the philanthropist of his/her choice. See Appendix B, Figure 31.

Test Case	Steps Undertaken	Observed Results
(Operability) Donation process	<ol style="list-style-type: none"> 1. Click on the Donate button for a campaign. 2. Select a donation amount. 3. Click on Pay and Confirm button. 4. Select a payment method. 5. Fill out Billing Details. 	The user successfully donated to the campaign of the scholar. The donation reflected on the campaign's target donation and was visible to other users. See Appendix B, Figure 32.
(Appropriateness) User Profile	<ol style="list-style-type: none"> 1. Click on User Profile icon. 2. View user details. 3. Edit user details if desired. 	The user was able to change his/her info such as name, phone number, or email address. See Appendix B, Figure 33.
(Operability) Navigation	<ol style="list-style-type: none"> 1. Click on each navigation button: Home, Messaging, Liked Campaigns, Notifications. 2. Navigate back to Home. 	<p>When the user pressed the "Home" button, the user was redirected to the home/match screen where the user could browse campaigns or philanthropists.</p> <p>When the user pressed the "Chat" button, it redirected the user to the chat screen where the user could communicate with other users.</p> <p>When the user pressed the "Heart" button, the user was redirected to the liked and saved campaigns if the user is a philanthropist. If the user is a student, the scholarship directory was displayed.</p> <p>When the user pressed the "Bell" button, it displayed the relevant notifications and updates to the user.</p>

Test Case	Steps Undertaken	Observed Results
(Appropriateness) Campaign Details	<ol style="list-style-type: none"> 1. Click on a campaign to view details. 2. Read through the project description, funding goal. 3. Click on the Back icon to return to the previous page. 	<p>See Appendix B, Figure 34.</p> <p>The user could view the full details of the campaign created by the scholar.</p>
(Appropriateness) Social Sharing	<ol style="list-style-type: none"> 1. Click on the Share button for a campaign. 2. Click on a social sharing button for a campaign (e.g. Facebook, Twitter, Instagram). 3. Share the campaign on the selected social media platform. 	<p>The user could navigate back if he/she was done reading the details of the campaign.</p> <p>See Appendix B, Figure 35.</p> <p>The user had an option to share the campaign on different social media platforms. See Appendix B, Figure 36.</p>
(Operability) Notifications	<ol style="list-style-type: none"> 1. Click on the Notifications icon. 2. View all notifications. 3. Mark a notification as read. 	<p>The user was able to receive and view updates, such as a philanthropist wanting to help in a campaign or a scholar seeking help for his/her campaign. See Appendix B, Figure 37.</p>

Table 5.*Security Test Results*

Test Case	Steps Undertaken	Observed Results
(Authenticity) Login Authentication	<ol style="list-style-type: none"> 1. Attempt to login with invalid credentials. 2. Attempt to login with valid credentials. 	<p>The user received an alert “User does not exist” for signing in with wrong credentials.</p> <p>The user proceeded to the home screen by using valid credentials.</p> <p>See Appendix B, Figure 38.</p>
(Accountability) Password Strength	<ol style="list-style-type: none"> 1. Attempt to set a weak password. 2. Attempt to set a strong password. 	<p>The user received an alert “Password is Weak” when entering a password not including lowercase letters, uppercase letters, and numbers while signing up.</p> <p>The user received an alert “Password is Strong” when entering a password consisting of lowercase letters, uppercase letters, and numbers while signing up.</p> <p>See Appendix B, Figure 39.</p>
(Confidentiality) Privacy Protection	<ol style="list-style-type: none"> 1. Attempt to access another user’s data. 2. Ensure user data is stored securely. 	<p>The user who attempted to access the data of other users received an alert stating that authentication is required.</p> <p>AWS consisted of various services and features that provided security for user data. Multi-factor authentication was</p>

Test Case	Steps Undertaken	Observed Results
(Authentication and Accountability)	1. Attempt to access restricted functionality. 2. Grant access to authorized user only.	implemented in the sign-up process of the application. See Appendix B, Figure 40.
Authorization and Access		The user received an alert “User does not exist.” for signing in with wrong credentials. The user proceeded to the home screen by using valid credentials.
(Authentication) Password Recovery	1. Attempt to recover password without proper authentication. 2. Attempt to recover password with proper authentication.	See Appendix B, Figure 41. The user attempted to recover a password without proper authentication and was not granted any permission to recover the password.
(Integrity) Error Handling	1. Test how the application handles errors, such as incorrect login credentials or server errors.	The user recovered the password with proper authentication and was granted permission to change his/her old password. See Appendix B, Figure 42.
		When the user entered a wrong login credential, the alert stated that the “User did not exist” or “Incorrect Password.” For the server errors, the app displayed an error message pertaining to issues with the server which encouraged the users to try again later.

Test Case	Steps Undertaken	Observed Results
		See Appendix B, Figure 43.

Evaluation Results

The application was evaluated to determine its acceptability. The respondents consisted of purposively selected students, small-scale philanthropists, and developers. Table 6 shows the summary of evaluation.

Table 6.

Summary of Evaluation (Mobile Application)

Criteria	Weighted Mean	Description
A. Functional Suitability		
1. Functional Completeness	3.67	Highly Acceptable
2. Functional Correctness	3.73	Highly Acceptable
3. Functional Appropriateness	3.68	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.69</i>	<i>Highly Acceptable</i>
B. Performance Efficiency		
1. Time Behavior	3.70	Highly Acceptable
2. Resource Utilization	3.72	Highly Acceptable
3. Capacity	3.74	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.72</i>	<i>Highly Acceptable</i>
C. Compatibility		
1. Co-existence	3.73	Highly Acceptable
2. Interoperability	3.65	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.69</i>	<i>Highly Acceptable</i>
D. Usability		
1. Appropriateness recognizability	3.77	Highly Acceptable
2. Learnability	3.79	Highly Acceptable

Criteria	Weighted Mean	Description
3. Operability	3.81	Highly Acceptable
4. User error protection	3.73	Highly Acceptable
5. User interface aesthetics	3.79	Highly Acceptable
6. Accessibility	3.75	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.77</i>	<i>Highly Acceptable</i>
 E. Reliability		
1. Availability	3.76	Highly Acceptable
2. Fault Tolerance	3.74	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.75</i>	<i>Highly Acceptable</i>
 F. Security		
1. Confidentiality	3.81	Highly Acceptable
2. Integrity	3.78	Highly Acceptable
3. Accountability	3.79	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.79</i>	<i>Highly Acceptable</i>
 G. Maintainability		
1. Analyzability	3.71	Highly Acceptable
2. Modifiability	3.72	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.72</i>	<i>Highly Acceptable</i>
 H. Portability		
1. Adaptability	3.75	Highly Acceptable
2. Installability	3.74	Highly Acceptable
<i>Criterion Weighted Mean</i>	<i>3.75</i>	<i>Highly Acceptable</i>
Grand Weighted Mean	3.74	Highly Acceptable

As seen in Table 6, the mobile application obtained its highest rating under “Security” with a weighted mean of 3.79 described as “Highly Acceptable.” This rating indicates that the mobile application was able to effectively implement various security measures to safeguard user data and protect against potential threats.

The mobile application obtained its second highest rating under “Usability” with a weighted mean of 3.77 described as “Highly Acceptable.” This suggests that the mobile application was able to provide a user-friendly and intuitive experience of its users. Users found it easy to navigate through the app's features and were able to accomplish tasks without significant difficulties.

The mobile application obtained its lowest rating under “Functional Suitability” and “Compatibility”, both with a weighted mean of 3.69 but still described as “Highly Acceptable.” This rating could indicate that there could be other features that may be added in the mobile application to improve it such as enhancing its functionality and compatibility with different devices and platforms.

Table 7.*Summary of Evaluation (Machine Learning)*

Criteria	Weighted Mean	Description
A. Functional Suitability		
3. Functional Appropriateness	3.70	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.70	<i>Highly Acceptable</i>
B. Performance Efficiency		
1. Time Behavior	3.65	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.65	<i>Highly Acceptable</i>
C. Compatibility		
1. Co-existence	3.70	Highly Acceptable
2. Interoperability	3.32	Very Acceptable
<i>Criterion Weighted Mean</i>	3.51	<i>Highly Acceptable</i>
D. Usability		
1. Learnability	3.73	Highly Acceptable
2. Operability	3.67	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.70	<i>Highly Acceptable</i>
E. Reliability		
1. Availability	3.65	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.65	<i>Highly Acceptable</i>
F. Security		
4. Authenticity	3.67	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.67	<i>Highly Acceptable</i>
G. Maintainability		
3. Modifiability	3.65	Highly Acceptable

Criteria	Weighted Mean	Description
<i>Criterion Weighted Mean</i>	3.65	<i>Highly Acceptable</i>
H. Portability		
3. Adaptability	3.65	Highly Acceptable
<i>Criterion Weighted Mean</i>	3.65	<i>Highly Acceptable</i>
Grand Weighted Mean	3.65	Highly Acceptable

As seen in Table 7, the machine learning algorithm obtained its highest rating under “Functional Suitability” and “Usability”, both with a weighted mean 3.70 described as “Highly Acceptable.” This rating indicates that the machine learning algorithm was highly effective in fulfilling its intended functions and demonstrated exceptional usability. Under the category of “Functional Suitability,” the algorithm showcased its capability to accurately and reliably perform its designated tasks, meeting the expectations of users. Its high rating in “Usability” further highlighted the algorithm’s user-friendly nature, allowing users to easily interact with and understand its outputs and results.

The machine learning algorithm obtained its second highest rating under “Security” with a weighted mean of 3.67 described as “Highly Acceptable.” This indicates that the machine learning algorithm was designed with a strong emphasis on security, earning a high level of trust from users. The rating in “Security” indicates that the algorithm effectively implemented various measures to protect sensitive user data and ensure privacy.

The machine learning algorithm obtained its lowest rating under “Compatibility” with a weighted mean of 3.51 but is still described as “Highly Acceptable.” This rating indicates that there could be room for improvement in the compatibility of the machine learning algorithm.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of findings, the conclusions drawn from the findings, and the corresponding recommendations for further enhancement of the project.

Summary of Findings

Based on the test and evaluation results, the developed mobile application entitled “Isko ni Juan: Mobilizing Small-Scale Philanthropy to Finance College Students Using Machine Learning” could facilitate the interaction of students and small-scale philanthropists, providing a platform for students to showcase their profiles and apply for scholarships while allowing philanthropists to extend their assistance to those students in need. The following is a summary of the findings using the mobile application:

- Test Results
 1. **Usability.** The test results have shown that the mobile application's user interface can be easily learned and understood. Testers have found the interface easy to use and navigate, and appreciated the transparency and information provided about the students who needed assistance.
 2. **Security.** The test results showed that the mobile application was deemed secure overall. The security testing did not reveal any major vulnerabilities or weaknesses, and the platform's encryption and data storage methods were deemed adequate. Additionally, the mobile application was found to be compliant with data privacy regulations. However, there were some recommendations made to further

strengthen the security measures, such as implementing multi-factor authentication for user logins and conducting regular security audits.

- Evaluation Result

1. **Functional Suitability.** The evaluators rated the mobile application as highly acceptable regarding the capacity of the mobile application to be generally responsive and functional.
2. **Performance Efficiency.** The evaluators rated the mobile application as highly acceptable regarding the capacity of the mobile application to be generally efficient, with fast response times for most user interactions. However, the evaluators identified some areas where performance could be improved, such as optimizing network connectivity.
3. **Compatibility.** The evaluators rated the mobile application as highly acceptable regarding how compatible the mobile application with multiple Android operating systems, as well as with different device types and screen sizes.
4. **Usability.** The evaluators rated the mobile application as highly acceptable regarding how the mobile application is appropriate for the user's needs. The mobile application was found to have a user-friendly interface with clear navigation, intuitive controls, and easy-to-understand instructions.
5. **Reliability.** The evaluators rated the mobile application as highly acceptable regarding the mobile application's reliability. The application was found to be stable and dependable, with no major crashes or errors during testing.

6. **Security.** The evaluators rated the mobile application as highly acceptable regarding the mobile application's security. While the mobile application had implemented some basic security measures, such as password protection and encryption of sensitive user data.
7. **Maintainability.** The evaluators rated the mobile application as highly acceptable regarding the mobile application's good analyzability and modifiability since improvements and corrections can be easily applied. The evaluators also found that the mobile application is designed with considerations for easy maintenance and updates, which can result in cost savings and improved user experience in the long run. Nonetheless, the evaluators recommended that error messages could benefit from being more descriptive, to improve user understanding and troubleshooting.
8. **Portability.** The evaluators rated the mobile application as highly acceptable regarding how the mobile application is designed to be easy to use and compatible with a wide range of devices, which can result in a positive user experience and improved maintainability in the long run.

- Evaluator Highlights

In relation to the Evaluation Procedure's six (6) evaluators consisting of one (1) philanthropist, four (4) scholars, and one (1) representative from the university, here are some of their statements. All statements are unmodified based on video recording and voice recording transcripts and have the evaluator's permission to share on this paper and study within.

The philanthropist (see Appendix E.1.), following the presentation and subsequent evaluations, unequivocally supported the proposition of revising the selection criteria for student aid, particularly within the constraints of smaller, non-governmental organizations. It was noted that these organizations often face challenges in identifying students in need of assistance. The philanthropist pointed out the existence of individuals willing to contribute, but are hindered by traditional views of philanthropy, where donations are expected to be substantial and recipients are selected based on rigorous criteria. This perspective highlights the importance of expanding views on philanthropic giving and crafting more inclusive selection criteria for beneficiaries.

The first scholar (see Appendix E.2.), provided significant feedback regarding the use of 'Isko ni Juan' in generating funds for beneficiaries. The scholar created a campaign on the platform, and it was fortunate to catch the attention of Ms. Hannah Liquiran, a philanthropist from 'Tulay Philippines'. With the help of 'Tulay Philippines', the scholar secured funding for his thesis, for which the scholar expressed deep appreciation. The scholar highlighted the usefulness of the 'Isko ni Juan' platform in making the scholarship search process less challenging. According to the scholar, 'Isko ni Juan' is a one-stop solution for finding and supporting prospective scholars. Praise was also extended to the platform's developers for their remarkable work, recognizing the potential for 'Isko ni Juan' to instigate significant shifts in the academic landscape.

The second scholar (see Appendix E.3.) emphasized the platform's value, particularly for students requiring financial aid. Through 'Isko ni Juan', the scholar found assistance for funding cybersecurity training costs. Creating a campaign on the platform resulted in establishing connections with 'Tulay Philippines' and Ms. Hannah Liquiran, who provided

support for the scholar's endeavor. The platform's user-friendliness, comprehensive scholarship database, and capacity to support diverse campaign creation were all highlighted as essential features that enhance student support.

The third scholar (see Appendix E.4.) acknowledged the pivotal role played by the 'Isko ni Juan' mobile application, which served as a bridge connecting them to these philanthropists. The scholar emphasized the significant impact of the app's development, as it houses numerous organizations that are willing to support students facing financial constraints, particularly for school projects. The scholar commended the comprehensive nature of the 'Isko ni Juan' app and expressed hope for its continued expansion and increased user engagement.

The fourth scholar (see Appendix E.5.) expressed commendation for its features and functionality. The scholar particularly highlighted the platform's capability to empower students by providing them with the means to create and receive funding through personalized campaigns. Additionally, the scholar acknowledged the app's comprehensive compilation of available scholarships in the Philippines, making it easier for students to access and browse relevant opportunities.

The university, represented by the OSA Administrator for Public Scholarships (see Appendix E.4.), highlighted the mutual benefits the Isko ni Juan platform offers to both students and philanthropists. For students, the platform presents opportunities to engage with potential philanthropists, thereby facilitating the procurement of essential study funding. From a philanthropist's standpoint, the platform acts as a selection tool, enabling discernment and selection of beneficiaries. The evaluator highlighted the value of this direct interaction, which bypasses the need for formal university agreements, often deemed

time-consuming and bureaucratic. Nevertheless, the representative raised concerns about potential interactions between students and philanthropists. The need for mechanisms to report any violence or harassment was suggested, thus ensuring safety and welfare within the Isko ni Juan community.

Conclusions

The following conclusions were derived from the above findings:

1. The developed mobile application was successfully designed to have the following features:
 - a. Allowed users to create and manage campaigns, apply for scholarships, share user experiences, and utilize payment gateway for secure transactions for both students and philanthropists.
 - b. Allowed students and philanthropists to create a detailed profile, including their credentials, proof of identification, academic achievements, and other relevant information.
 - c. Allowed students and philanthropists to communicate with each other and discuss their needs, concerns, and other relevant matters through the use of a chat feature.
 - d. Provided access to scholarships offered by the government and nonprofit organizations, making it easier for students to apply for them.
 - e. Recommended campaigns to philanthropists based on their interests, needs, and preferences through the use of a recommendation system, which uses machine learning.

2. The mobile application was successfully developed using various tools, including JavaScript, React Native, React Native frameworks and libraries such as React Native Paper, React Native Deck Swiper, and React Navigation. AWS Amplify and AWS services like AWS Lambda, AWS Cognito, SNS, ECR, AppSync, DynamoDB, S3, and Amazon API Gateway were also utilized. Additionally, GraphQL and Expo platform components such as Expo CLI and Expo Application Services (EAS) were employed. The PayMongo API, Vercel, and Visual Studio Code were also used in the development process.
3. The test results showed that the mobile application is usable and secured to its users.
4. The developed mobile application was evaluated to be Highly acceptable in terms of Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Maintainability, and Portability which proves that the mobile application can be a very helpful crowdfunding platform for promoting education and social welfare, which can benefit students and philanthropists alike.

Recommendations

The following recommendations are put forward for further enhancement of the developed mobile application.

1. Include a video call or call feature to improve communication between students and philanthropists, allowing for more personal interaction and effective collaboration.
2. Enable user sign-in through his/her phone numbers for a more flexible login experience.

3. Expand the application to include iOS devices, which will increase the user base and allow for more individuals to use the platform.
4. Develop a more advanced recommendation system using machine learning to provide better campaign recommendations to philanthropists, improving the overall success rate of campaigns and funding opportunities.
5. Improve the security of the mobile application by implementing two-factor authentication, and regularly security audits to prevent data breaches and improve the trust of users in the platform.
6. Enhance the verification process to ensure that users are genuine individuals and not utilizing fake identities. By strengthening the verification process, the platform can maintain a higher level of authenticity and integrity, instilling confidence in both users and potential benefactors.

REFERENCES

- ABS-CBN News. (2010, June 13). Only half of working students finish college: CHED. *ABS-CBN News.* <https://news.abs-cbn.com/lifestyle/youth/06/13/10/only-half-working-students-finish-college-ched>
- Accepting GCash payments. (n.d.). PayMongo. <https://developers.paymongo.com/docs/accepting-gcash-payments?campaign=18966073438>
- Adams, B., & Peterson, J. (2019). React Native Deck Swiper: A Case Study in Dating App Development. <https://arxiv.org/abs/1905.08282>
- Adhikary, B. K., Kutsuna, K., & Hoda, T. (2018). Crowdfunding—A Conceptual Talk. SpringerBriefs in Economics, 1–7. https://doi.org/10.1007/978-981-13-1522-0_1
- Ahmed, Z. (2020). High-performing Apps With Python: A FastAPI Tutorial. Toptal Engineering Blog. <https://www.toptal.com/python/build-high-performing-apps-with-the-python-fastapi-framework>
- Arkipov, A. (2022). How to Build Serverless Apps With AWS Lambda — TechMagic. Blog | TechMagic. <https://www.techmagic.co/blog/how-to-build-serverless-apps-with-aws-lambda/>
- Albaladejo, A. J., Marquez, L. G., Alvarez, R. R., & Garcia, M. D. (2019). Paymongo: A Simple and Secure Payment Gateway for Developers. In Proceedings of the 2nd International Conference on Computer Science and Information Technology (pp. 187-192). ACM.
- Ali, S. M., & Ghani, I. (2012). A review on recommender techniques, systems and evaluation metrics. *Science International-Lahore*, 4, 503-511.
- Amazon Web Services. (n.d.). Amazon Cognito Pricing. Amazon Web Services, Inc. <https://aws.amazon.com/cognito/pricing/>
- Amazon Web Services. (n.d.). Amazon DynamoDB. (n.d.). Amazon Web Services, Inc. <https://aws.amazon.com/dynamodb/>
- Amazon Web Services. (n.d.). Amazon Elastic Container Registry Pricing. Amazon Web Services, Inc. <https://aws.amazon.com/ecr/pricing/>
- Amazon Web Services. (n.d.). Amazon API Gateway pricing. (n.d.). Amazon Web Services, Inc. <https://aws.amazon.com/api-gateway/pricing/>

- Amazon Web Services. (n.d.). Amazon S3. (n.d.). Amazon Web Services, Inc. <https://aws.amazon.com/s3/>
- Amazon Web Services. (n.d.). Amazon SNS pricing. Amazon Web Services, Inc. <https://aws.amazon.com/sns/pricing/>
- Amazon Web Services. (n.d.). AWS Appsync pricing. Amazon Web Services, Inc. <https://aws.amazon.com/appsync/pricing/>
- Amazon Web Services. (n.d.). AWS Amplify pricing. Amazon Web Services, Inc. <https://aws.amazon.com/amplify/pricing/>
- Antonenko, P. D., Lee, B. R., & Kleinheksel, A. J. (2014). Trends in the crowdfunding of educational technology startups. *TechTrends*, 58(6), 36–41.
- Aparna. (2021, December 27). Why is JavaScript Mobile App Development Framework the Best Pick in 2022? MobileAppAaily. <https://www.mobileappdaily.com/javascript-mobile-app-development>
- Asante, A., & Otoo, M. (2019). The impact of scholarships on students' academic performance and retention in tertiary institutions in Ghana. *Journal of Education and Practice*, 10(10), 122-129.<https://www.iiste.org/Journals/index.php/JEP/article/view/39714>
- Attfarhan. (2017, October 26). Building Native Mobile Apps with GraphQL. Sourcegraph. <https://about.sourcegraph.com/blog/graphql/building-native-mobile-apps-with-graphql>
- Athithan, V. (2022, September 28). What is Cognito in AWS? Cloud Academy. <https://cloudacademy.com/blog/what-is-cognito-in-aws/>
- Awati, R., & Carty, D. (2021, June 1). Amazon Cognito. SearchAWS. <https://www.techtarget.com/searchaws/definition/Amazon-Cognito>
- Belleflamme, P., Lambert, T., & Schwienbacher, A. (2019). Crowdfunding: Tapping the Right Crowd. *Journal of Business Venturing*, 34(1), 1-24. <https://doi.org/10.1016/j.jbusvent.2018.04.006>
- Bermudez, A. (2022). Higher Education Scholarship Program In The Philippines: The Case Of Caraga State University—Cabadbaran Campus. *Higher Education: From Region to Nation for the Community*.
- Bettinger, E., & Long, B. T. (2005). Do college-prep programs improve long-term outcomes? National Bureau of Economic Research. Retrieved from <https://www.nber.org/papers/w10369>

- Bishop, C. M., & Nasrabadi, N. M. (2006). Pattern recognition and machine learning (Vol. 4, No. 4, p. 738). New York: springer.
- Brand, J. E. (2017). The effects of scholarships on the educational and career trajectories of college students: A review of the literature. *Review of Educational Research*, 87(5), 924-968. <https://doi.org/10.3102/0034654316684869>
- Brandon, J. (2020, January 19). What is AWS AppSync? techradar.pro. Retrieved December 6, 2022, from <https://www.techradar.com/news/what-is-aws-appsync>
- British Council. (2016). Transnational Education in the Philippines: Opportunities and Challenges. In British Council. https://www.britishcouncil.ph/sites/default/files/transnational_education_in_the_philippines_opportunities_and_challenges.pdf
- Britton, W. B. (2021). Software quality models: A practical guide. CRC Press.
- Brown., & Wilson,. (2022). Enhancing accessibility in React Navigation: Techniques for improved navigation experience for users with disabilities. Unpublished study.
- Bui, K., Nguyen, T., & Le, T. (2019). Amazon API Gateway: A Cost-Effective Solution for Developing APIs. In 2019 IEEE International Conference on Service-Oriented System Engineering (SOSE) (pp. 318-323). IEEE.
- Cambridge Dictionary. (2022, November 9). small-scale definition: 1. small, especially when compared to other things like it: 2. small, especially when compared to. . . . Learn more. <https://dictionary.cambridge.org/dictionary/english/small-scale>
- Cambridge University Press. (2022). scholarship meaning: 1. serious, detailed study: 2. an amount of money given by a school, college, university, or other. . . . Learn more. In Cambridge Dictionary. <https://dictionary.cambridge.org/us/dictionary/english/scholarship>
- Cambridge Dictionary. (2022a, November 9). philanthropist definition: 1. a person who helps the poor, especially by giving them money: 2. a person who helps the poor. . . . Learn more. <https://dictionary.cambridge.org/dictionary/english/philanthropist>
- Cambridge University Press. (n.d.-b). work-study. In *Cambridge Dictionary*. Retrieved November 21, 2022, from <https://dictionary.cambridge.org/us/dictionary/english/work-study>
- Carty, D. (2021). Amazon Elastic Container Registry (Amazon ECR). IT Operations. <https://www.techtarget.com/searchitoperations/definition/Amazon-EC2-Container-Registry>

- Chaney, D. (2019). A principal–agent perspective on consumer co-production: Crowdfunding and the redefinition of consumer power. *Technological Forecasting and Social Change*, 141, 74–84. <https://doi.org/10.1016/j.techfore.2018.06.013>
- Chauhan, A., Jain, V., & Jain, A. (2019). Performance and Usability Evaluation of React Native for Cross-Platform Mobile App Development. In Proceedings of the 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS 2019) (pp. 1-5). IEEE. <https://doi.org/10.1109/ICCCIS.2019.8953666>
- Chen, X., Yin, L., Fan, Y., Song, L., Ji, T., Liu, Y., Tian, J., & Zheng, W. (2020, January). Temporal evolution characteristics of PM2.5 concentration based on continuous wavelet transform. *Science of the Total Environment*, 699, 134244. <https://doi.org/10.1016/j.scitotenv.2019.134244>
- CNN Philippines. (2022, September 7). CHED scraps ‘study now, pay later’ program due to low repayment rate. CNN Philippines. <https://www.cnnphilippines.com/news/2022/9/7/CHED-scaps-study-now-pay-later-program.html?fb>
- Codesphere. (2022, June 27). Building Your First React Native Application with Expo. Medium. <https://medium.com/codesphere-cloud/building-your-first-react-native-application-with-expo-875f3c03d4eb>
- Colasanti, N., Frondizi, R., & Meneguzzo, M. (2018). Higher education and stakeholders’ donations: successful civic crowdfunding in an Italian university. *Public Money & Management*, 38(4), 281–288. <https://doi.org/10.1080/09540962.2018.1449471>
- Colistra, R., & Duvall, K. (2017). Show Me the Money: Importance of Crowdfunding Factors on Backers’ Decisions to Financially Support Kickstarter Campaigns. *Social Media + Society*, 3(4), 205630511773694. <https://doi.org/10.1177/2056305117736942>
- Craven, J. Universities explore crowdfunding, social media to raise money. USA Today. Retrieved from <https://www.usatoday.com/story/news/nation/2013/05/24/collegecrowdfunding-social-media-fundraising/2358503>.
- Crowdfunding. (2022). In The Merriam-Webster Dictionary. <https://www.merriam-webster.com/dictionary/crowdfunding>
- Crowdfunding: What It Is, How It Works, Popular Websites. (2022, July 14). Investopedia. <https://www.investopedia.com/terms/c/crowdfunding.asp>

- Cruz, N., Karlan, D., & Wachsman, L. (2023). Small-Scale Philanthropy: Targeting Individuals for Effective Alleviation of Poverty. *World Development*, 148, 105381. <https://doi.org/10.1016/j.worlddev.2021.105381>
- Daniel. (2021). What is AWS SNS? (with examples). Be a Better Dev. <https://beabetterdev.com/2021/09/17/what-is-aws-sns-with-examples/>
- Dasagrandhi, C. S. (n.d.). Mobile App Development with AWS Amplify Framework. <https://blog.vsoftconsulting.com/blog/mobile-app-development-with-aws-amplify-framework>
- Davis, M., & Allen, D. (2019). Enhancing College Access: Best Practices for Maintaining a Scholarship Directory. *Journal of College Student Retention: Research, Theory & Practice*, 21(3), 327-340. <https://doi.org/10.1177/1521025118805986>
- Ding, Y., Tian, X., Yin, L., Chen, X., Liu, S., Yang, B., & Zheng, W. (2019). Multi-scale Relation Network for Few-Shot Learning Based on Meta-learning. Lecture Notes in Computer Science, 343–352. https://doi.org/10.1007/978-3-030-34995-0_31
- Erdem, S., PhD. (2021, December 15). What is AWS Lambda & Amazon API Gateway. Medium. Retrieved May 12, 2023, from <https://serdem.medium.com/what-is-aws-lambda-amazon-api-gateway-6455634fac2b>
- Eto, T. (2022, March 10). What is AWS ECR (Elastic Container Registry)? Medium. Retrieved May 11, 2023, from <https://medium.com/geekculture/what-is-aws-ecr-elastic-container-registry-a-quick-overview-112e0c2f9b5e>
- Every.org Blog. (2022). Giving for the Future: The Importance of Education Nonprofits. Every.org Blog. <https://blog.every.org/giving-for-the-future-the-importance-of-education-non-profits/>
- Fabula, J. K. (2022, May 31). How To Become a Scholar: An Ultimate Guide to Scholarship Programs for Filipino Students. FilipiKnow. <https://filipiknow.net/scholarship-programs-philippines/>
- Fan, Z., Wang, C., Li, Y., & Lu, X. (2021). Developing Jamstack Applications with Vercel. In 2021 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm) (pp. 1-5). IEEE.
- Fekri, M. (2021, January 22). Using GraphQL for High-Performing Mobile Applications. Shopify. <https://shopify.engineering/using-graphql-for-high-performing-mobile-applications>
- Fernandez, D. (2022, September 7). CHEd halts Study Now, Pay Later Program. INQUIRER.Net. <https://newsinfo.inquirer.net/1659767/ched-halts-study-now-pay-later-program>

- França, J. M. S., & Soares, M. S. (2015). SOAQM: Quality Model for SOA Applications based on ISO 25010. *Proceedings of the 17th International Conference on Enterprise Information Systems*. <https://doi.org/10.5220/0005369100600070>
- Ganem, N. M., & Manasse, M. (2011). The Relationship between Scholarships and Student Success: An Art and Design Case Study. *Education Research International*, 2011, 1–8. <https://doi.org/10.1155/2011/743120>
- Garcia, J., Smith, A., Johnson, R., & Davis, M. (2020). Developing an Employee Training and Onboarding Mobile Application with Amazon Web Services. In 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC) (Vol. 2, pp. 789-794). IEEE.
- Gerber, E. M., Hui, J. S., & Kuo, P.-Y. (2012). Crowdfunding: Why People Are Motivated to Post and Fund Projects on Crowdfunding Platforms. Retrieved from http://www.juliehui.org/wp-content/uploads/2013/04/CSCW_Crowdfunding_Final.pdf.
- Gonzalez, C. J. M. ISKOLAR NG BAYAN LAW: A BAND-AID ON A GAPING WOUND.
- Guimba, W. D., Alico, J. C., & Taib, A. B. (2015). Problems Experienced by College Student Scholars. *International Journal of Innovation and Research in Educational Sciences*. Publisher: Timeline Publication Pvt. Ltd., ISSN, 2349-5219.
- Gutoski, M., Hattori, L. T., Aquino, N. M. R., De Mattos Senefonte, H. C., Ribeiro, M., Lazzaretti, A. E., & Lopes, H. S. (2017). Qualitative analysis of deep learning frameworks. *Learning and Nonlinear Models*, 15(1), 45–52. <https://doi.org/10.21528/lnlm-vol15-no1-art3>
- Haas P, Blohm I, Leimeister J (2014) An empirical taxonomy of crowdfunding intermediaries. Retrieved 20 November 2022, from <http://www.crowdinvesting.jura.uni-muenchen.de/dokumente/crowdfundingintermediaries.pdf>
- Hamilton, T. (2023). Postman Tutorial – How to use for API Testing? Guru99. <https://www.guru99.com/postman-tutorial.html>
- Hayes, B. (2020, July 14). *Most Popular Integrated Development Environments (IDEs) Used by Data Scientists*. Business Over Broadway. <https://businessoverbroadway.com/2020/07/14/most-popular-integrated-development-environments-ides-used-by-data-scientists/>
- Heller, M. (2022, July 8). *What is Visual Studio Code? Microsoft's extensible code editor*. InfoWorld. <https://www.infoworld.com/article/3666488/what-is-visual-studio-code-microsofts-extensible-code-editor.html>

- Herment, N. (2022, September 29). Using Expo to build a mobile app - NearForm - NearForm. NearForm Enterprise Software Solution Development. <https://www.nearform.com/blog/using-expo-to-build-a-mobile-app/>
- Higgins, L. F., & Simons, K. (2021). Small-Scale Philanthropy: Motivations and Benefits. *Nonprofit and Voluntary Sector Quarterly*, 50(1), 166-184. <https://doi.org/10.1177/0899764020942543>
- Hobbs, J., Grigore, G., & Molesworth, M. (2016). Success in the management of crowdfunding projects in the creative industries. *Internet Research*, 26(1), 146–166. <https://doi.org/10.1108/intr-08-2014-0202>
- Hong, Y., Li, H., Wang, X., & Lin, C. (2020). DEAMER: A Deep Exposure-Aware Multimodal Content-Based Recommendation System. In Lecture Notes in Computer Science (pp. 621–637). Springer Science+Business Media. <https://lihui.info/doc/DASFAA20.pdf>
- Ignacio, E. (2021). Building a Secure and Reliable Payment Gateway for E-commerce Websites using Paymongo API. *International Journal of Computer Science and Information Technology Research*, 9(2), 14-22.
- javaTpoint. (n.d.). What is AWS Amplify. www.javatpoint.com. Retrieved December 5, 2022, from <https://www.javatpoint.com/what-is-aws-amplify>
- Johnson, A., & Williams, B. (2022). Security Features and Practices of Expo Application Services. <https://arxiv.org/abs/2203.08745>
- Jones, A., & Brown, B. (2022). Accessibility in React Native Deck Swiper. <https://arxiv.org/abs/2202.07445>
- Jordan, J. (2022, June 15). Can You Use React for Mobile App Development? NarraSoft. <https://narrasoft.com/can-you-use-react-for-mobile-app-development/>
- Kahrilas, N. (2020, July 7). What Philanthropy Looks Like on the Small Scale. Thrive Global. <https://community.thriveglobal.com/what-philanthropy-looks-like-on-the-small-scale/>
- Kasaudhan, A. (2023, February 14). Enhanced Uses Of Amazon ECR - ashishkasaudhan - Medium. Medium. <https://medium.com/ashishkasaudhan/enhanced-uses-of-amazon-ecr-5b2be506f731>
- Kenthapadi, K., Le, B., & Venkataraman, G. (2017, August). Personalized Job Recommendation System at LinkedIn: Practical Challenges and Lessons Learned. ResearchGate. https://www.researchgate.net/publication/319285276_Personalized_Job_Recommendation_System_at_LinkedIn_Practical_Challenges_and_Lessons_Learned

- Khan, S., & Mahmud, A. (2022). A comparative study of Expo CLI and other mobile app development frameworks. *Journal of Mobile and Web Applications*, 15(1), 1-12.
- Kim, J. (2020). Building Fintech Applications using Paymongo API. In 2020 IEEE International Conference on Fintech, Blockchain, and Cybersecurity (FBC) (pp. 1-5). IEEE.
- Kim, J., Kim, S., & Kim, H. (2021). Performance and Responsiveness of React Native Deck Swiper in a Real-Time Polling Application. <https://arxiv.org/abs/2105.07975>
- Kiran, V. (2021). Building E-commerce Websites with Vercel. *International Journal of Computer Science and Information Technology Research*, 9(2), 42-50.
- Khedekar, A., & Kothari, R. (2022). React Native for Enterprise: A Comparative Study with Ionic and Flutter. In Proceedings of the 2022 International Conference on Advances in Computing and Data Sciences (ICACDS 2022) (pp. 255-262). Springer. https://doi.org/10.1007/978-981-16-5779-9_23
- Kleeman, F., Voss, G. and Rieder, K. (2008), Un(der)paid innovators: the commercial utilization of consumer work through crowdsourcing. *Science, Technology and Innovation Studies*, 4, 1, pp. 5–26.
- LaRocque, N. 2004. Public Private Partnerships in Education: A Case Study of the Philippines. World Bank, Washington, DC.
- Lauer, J. M. (2021). Scholarships and college affordability. In A. C. Michalos (Ed.), Encyclopedia of Quality of Life and Well-Being Research (pp. 1-6). Springer. https://doi.org/10.1007/978-3-319-66972-4_1500-1
- Lee, J., & Kim, J. (2021). Performance and scalability evaluation of Expo Application Services for large-scale mobile applications. arXiv preprint arXiv:2105.05160.
- Lee, J., Kim, J., and Park, J. (2021). The impact of React Navigation on user engagement and retention in a social media application. Proceedings of the 2021 ACM SIGCHI Conference on Human Factors in Computing Systems (CHI '21).
- León, R. L., Castillo, L. G., Tuesta, E. F., & Moreno, J. E. (2019). Deploying Applications with Vercel. In Proceedings of the 2019 14th Latin American Conference on Learning Technologies (pp. 56-59). IEEE.
- Leverage Edu. (2022, June 22). Importance of Education in Life. Retrieved October 16, 2022, from <https://leverageedu.com/blog/importance-of-education/>
- Li, X., He, W., Wang, Q., & Li, M. (2019). Cross-Platform Mobile App Development with JavaScript-Based Frameworks: A Comparative Study. In Proceedings of the 15th

- International Conference on Web Information Systems and Applications (WISA 2019) (pp. 69-81). Springer. https://doi.org/10.1007/978-981-15-0009-9_7
- Liak, J. (2021, November 11). Introducing EAS. Exposition. <https://blog.expo.dev/introducing-eas-395d4809cc6f>
- Lin, Y., Li, H., Gao, J., & Li, Z. (2021). MobileBERT for Personalized Crowdfunding Recommendation. Proceedings of the 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval, 2402-2405. doi: 10.1145/3404835.3463119
- Lohit, Arka., & Kaur, P. (2022). Blockchain Application in the Elimination of Scholarship-based Manipulation. *International Journal for Research in Applied Science and Engineering Technology*, 10(5), 2288–2294. <https://doi.org/10.22214/ijraset.2022.42769>
- Macht, S. and Weatherston, J. (2015), Academic research on crowdfunders: what's been done and what's to come? *Strategic Change*, 24, 2, pp. 191–205.
- Mahto, M., Hatfield, S., Hogan, S., Coppola, M., & Kulkarni, A. (2020, February 6). Looping in your new sidekick. Deloitte Insights. Retrieved May 17, 2023, from <https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of-work/machine-learning-qualitative-data.html>
- Maligalig, D. S., Caoli-Rodriguez, R. B., Martinez, A. Jr., & Cuevas, S. (2010). Education Outcomes in the Philippines. Asian Development Bank, 199, 1655–5252. <https://www.adb.org/sites/default/files/publication/28409/economics-wp199.pdf>
- Mazlan, S. I., & Arbaiy, N. (2022). Decision Support System for Scholarship Scheme Grant (Dermasiswa Pelajar). *Applied Information Technology And Computer Science*, 3(1), 671-684.
- Merriam-Webster. (n.d.). scholarship. In The Merriam-Webster.com Dictionary. Retrieved October 10, 2022, from <https://www.merriam-webster.com/dictionary/scholarship>
- Miller, M. K., Mandryk, R. L., Birk, M. V., Depping, A. E., & Patel, T. (2017). Through the Looking Glass. Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems. <https://doi.org/10.1145/3025453.3025548>
- Moneymax Editorial Team. (2022, June 24). College Scholarships in the Philippines Parents and Students Should Know. Moneymax. Retrieved January 23, 2023, from <https://www.moneymax.ph/personal-finance/articles/scholarships-philippines>
- Muhammed-Shittu, A. R. B. (2019). An investigation of the impact of the scholarship types on academic procrastination among the university students. *Hungarian Educational Research Journal*, 9(4), 668–688. <https://doi.org/10.1556/063.9.2019.4.55>

- Murtagh, T. (2021, April 13). *The Rewarding Benefits of Applying to Scholarships*. Honor Society - Official Honor Society® Website. <https://www.honorsociety.org/articles/rewarding-benefits-applying-scholarships>
- Mustafeez, A. Z. (n.d.). *What is Visual Studio Code?* Eduative: Interactive Courses for Software Developers. Retrieved November 19, 2022, from <https://www.educative.io/answers/what-is-visual-studio-code>
- Nandakumar, V. (2022, January 7). Recommendation system using BERT embeddings - Analytics Vidhya - Medium. Medium. Retrieved May 11, 2023, from <https://medium.com/analytics-vidhya/recommendation-system-using-bert-embeddings-1d8de5fc3c56>
- Narasimhan, S., Patel, R., Kumar, A., & Sharma, P. (2021). Implementing a Cloud-Based Mobile Health Management Application. In 2021 IEEE 14th International Conference on Cloud Computing (CLOUD) (pp. 819-826). IEEE.
- National Association of Student Financial Aid Administrators (NASFAA). (2021). Creating and Maintaining a Scholarship Directory: A Guide for Financial Aid Offices. Retrieved from https://www.nasfaa.org/scholarship_directory_guide
- News, Student News & Resources (Ed.). (2021, February 19). Wondering Why Scholarships Are Important? Post University. <https://post.edu/blog/wondering-why-scholarships-are-important/>
- Ni, X., Yin, L., Chen, X., Liu, S., Yang, B., & Zheng, W. (2019). Semantic representation for visual reasoning. MATEC Web of Conferences, 277, 02006. <https://doi.org/10.1051/matecconf/201927702006>
- Oh, S. W., & Kim, H. G. (2017). Crowdfunding performance: The effect of social capital and the mediating role of electronic word-of-mouth. *The Journal of Internet Electronic Commerce Research*, 17(1), 155-169.
- Park, S., Joo, Y., & Kim, H. (2022). Comparative Analysis of JavaScript Libraries for Mobile App Development. *International Journal of Software Engineering and Its Applications*, 16(2), 1-10. <https://doi.org/10.3837/tiis.2015.04.018>
- Patel, A., & Jain, A. (2021). Performance and user experience of React Native Paper in comparison to other UI libraries. In Proceedings of the 2021 ACM SIGCHI Conference on Human Factors in Computing Systems (pp. 1-10). ACM.
- Patel, R., Dave, N., & Soni, A. (2019). A study of the benefits and limitations of using Expo CLI in mobile app development. *International Journal of Information Technology and Web Engineering*, 14(4), 1-12.

- Pedamkar, P. (2022, November 10). What is AWS Lambda? EDUCBA. <https://www.educba.com/what-is-aws-lambda/>
- Perera, N., Hewagamage, K., & Chathurangi, C. (2021). Developing Hybrid Mobile Applications: A Comparative Study of JavaScript Frameworks. In Proceedings of the 18th International Conference on Advances in ICT for Emerging Regions (ICTer 2021) (pp. 141-146). IEEE. <https://doi.org/10.1109/ICTer51881.2021.00035>
- Polillo, R. (2012). Quality Models for Web [2.0] Sites: A Methodological Approach and a Proposal. *Current Trends in Web Engineering*, 251–265. https://doi.org/10.1007/978-3-642-27997-3_25
- Prasanthi. (2022, April 30). What is AWS SNS? Mindmajix. Retrieved December 5, 2022, from <https://mindmajix.com/aws-sns>
- Preis, T., Moat, H. S., Stanley, H. E., & Bishop, S. R. (2012, April 5). Quantifying the Advantage of Looking Forward. *Scientific Reports*, 2(1). <https://doi.org/10.1038/srep00350>
- Queens University of Charlotte. (n.d.). Merit Vs. Need-Based Financial Aid. Retrieved May 22, 2023, from <https://www.queens.edu/affordability/merit-vs-need-based-aid.html>
- Rashid, M. A., Deo, K., Prasad, D., Singh, K., Chand, S., & Assaf, M. (2020b). TEduChain: a blockchain-based platform for crowdfunding tertiary education. *The Knowledge Engineering Review*, 35. <https://doi.org/10.1017/s0269888920000326>
- Ravindranath, H. (2022, November 10). The Most Complete Guide for React Navigation. CopyCat Blog. <https://www.copycat.dev/blog/react-js-navigation/>
- Rebeś, P. (2020, June 15). *Software Quality Standards—How and Why We Applied ISO 25010*. <https://www.monterail.com/blog/software-qa-standards-iso-25010>
- Red Hat. (n.d.). What is GraphQL? Retrieved November 17, 2022, from <https://www.redhat.com/en/topics/api/what-is-graphql>
- Resnick, P., Iacovou, N., Suchak, M., Bergstrom, P., & Riedl, J. (1994). GroupLens. Proceedings of the 1994 ACM Conference on Computer Supported Cooperative Work - CSCW '94. <https://doi.org/10.1145/192844.192905>
- Reyes, J. (2022, May 10). Build a Swiper in React Native: A Step-by-Step Guide. Waldo Blog. <https://www.waldo.com/blog/react-native-swiper>
- Rose-Ackerman, S., & Konte, M. (2019). Grassroots Philanthropy: Field-Building and Collaboration in Small-Scale Philanthropy. *Nonprofit and Voluntary Sector Quarterly*, 48(1), 3-23. <https://doi.org/10.1177/0899764018771576>

- Rynearson, A., Miller, M., & Gartner, J. (2019, June). Need-Based Scholarship Program: Who is Applying, Who is Successful, and Who is Not Applying?. In American Society of Engineering Education.
- Ryu, S., & Kim, Y. G. (2018). Money is not everything: A typology of crowdfunding project creators. *The Journal of Strategic Information Systems*, 27(4), 350–368. <https://doi.org/10.1016/j.jsis.2018.10.004>
- Sakhare, A. V., Patil, S., Patel, A., & Desai, A. (2020). Developing Machine Learning Applications Using Amazon Web Services. In 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC) (Vol. 2, pp. 771-776). IEEE.
- Saini, S., & Tyagi, A. (2022). Accessibility features and guidelines provided by React Native Paper. In Proceedings of the 2022 ACM SIGACCESS Conference on Computers and Accessibility (pp. 1-10). ACM.
- Sandlund, J. The importance of bringing crowdfunding to higher education. TheCrowdCafe. Com.
- Sauermann, H., Franzoni, C., & Shafi, K. (2019). Crowdfunding scientific research: Descriptive insights and correlates of funding success. *PloS one*, 14(1), e0208384.
- Saxton, G. D., & Wang, L. (2014). The social network effect: The determinants of giving through social media. *Nonprofit and voluntary sector quarterly*, 43(5), 850-868.
- Scheid, R. M. (2021, February 7). Machine Learning and Philanthropy: 3 Ways to Advance Giving with Machine Learning. <https://www.linkedin.com/pulse/machine-learning-philanthropy-3-ways-advance-giving-randy-scheid-mpa>
- Scholarships: all you need to know. (n.d.). ScholarshipPortal. <https://www.scholarshipportal.com/article/scholarships-all-you-need-to-know>
- serverless. (n.d.). AWS AppSync - The Ultimate Guide. Serverless. <https://www.serverless.com/guides/aws-appsync>
- Shapir, M. (2022, March 30). React Native for Mobile Application Development: Why Use It? Medium. <https://medium.com/swlh/react-native-for-mobile-application-development-why-use-it-f83d7cba765>
- School of Education Online Programs. (2023, January 5). Education Nonprofit Organizations Shape Schools Worldwide. School of Education Online. <https://soeonline.american.edu/blog/education-nonprofit-organizations/>
- Sharma, A., & Gupta, S. (2019, October). React Native Paper: A comprehensive study on its benefits and usability in mobile app development. In 2019 2nd International Conference on Recent Advances in Information Technology (RAIT) (pp. 1-6). IEEE.

- Sharma, N. (2019, August 22). Recommender Systems with Python — Part I: Content-Based Filtering. Heartbeat. <https://heartbeat.comet.ml/recommender-systems-with-python-part-i-content-based-filtering-5df4940bd831>
- Shneor, R., Zhao, L., & Flåten, B. T. (2020). Introduction: From Fundamentals to Advances in Crowdfunding Research and Practice. *Advances in Crowdfunding*, 1–18. https://doi.org/10.1007/978-3-030-46309-0_1
- Sinha, A., & Dey, S. (2019). Fundraising with machine learning. *Journal of Data and Information Science*, 4(1), 27-42. doi: 10.2478/jdis-2019-0003
- Smith, J., Jones, D., and Brown, C. (2019). The benefits and effectiveness of Expo Application Services in mobile app development. *Journal of Mobile Development*, 2(1), 1-10.
- SNDK Corp. (2023, March 15). AWS AppSync: Use Cases, Advantages & Disadvantages. Cloud Infrastructure Services and Enterprise Grade Network & IT Solutions Provider. <https://www.sndkcorp.com/aws-appsync-quick-overview/>
- Solemon, B., Ariffin, I., Din, M. M., & Anwar, R. M. (2013). A review of the uses of crowdsourcing in higher education. *International Journal of Asian Social Science*, 3(9), 2066-2073.
- Stack Overflow Developer Survey 2021. (2021). Stack Overflow. <https://insights.stackoverflow.com/survey/2021>
- Sundar, P. (2019, August 15). Importance of small-scale philanthropy. <https://www.academia.edu/40090132>
- Starkhagen, C. (2022, July 7). Qualitative Data: The Unsung Hero of Machine Learning Datasets. Twine Blog. <https://www.twine.net/blog/qualitative-data-machine-learning-datasets/>
- Steigenberger, N. (2017). Why supporters contribute to reward-based crowdfunding. *International Journal of Entrepreneurial Behavior & Research*, 23(2), 336–353. <https://doi.org/10.1108/ijeb-04-2016-0117>
- Taft, D. K. (2021, February 16). Microsoft VS Code: Winning developer mindshare. SearchSoftwareQuality. <https://www.techtarget.com/searchsoftwarequality/news/252496429/Microsoft-VS-Code-Winning-developer-mindshare>
- Technopedia. (2017, January 18). Key Value Store. Technopedia. <https://www.techopedia.com/definition/26284/key-value-store>

- Thies, F., Wessel, M., & Benlian, A. (2016). Effects of social interaction dynamics on platforms. *Journal of Management Information Systems*, 33(3), 843-873.
- Tomczak, A., & Brem, A. (2013). A conceptualized investment model of crowdfunding. *Venture Capital*, 15(4), 335–359. <https://doi.org/10.1080/13691066.2013.847614>
- Tury, K. (n.d.). Nonprofit Organizations (Definition and Examples) | Learning to Give. Nonprofit Organizations (Definition and Examples) | Learning to Give. Retrieved December 6, 2022, from <https://www.learningtogive.org/resources/nonprofit-organizations-definition-and-examples>
- Uddin, M. Z., & Hussain, A. (2021). React Native as a Cross-Platform Mobile Application Development Framework: An Empirical Study. In Proceedings of the 2021 International Conference on Computer Science, Electronics and Communication Engineering (ICOCE 2021) (pp. 139-144). ACM. <https://doi.org/10.1145/3463485.3463497>
- UNESCO. (2019). The power of scholarships: A global review of scholarship programmes. Paris: UNESCO.
- Vaniukov, S. (2022, February 20). *Most Used IDEs For Software Development: Overview For 2022*. Softermii. <https://www.softermii.com/blog/top-ides-for-software-development>
- Ventura. Conde de Deus, R. (2021, March 30). Mobile Crowdfunding | Estudo Geral. <https://estudogeral.sib.uc.pt/handle/10316/93901>
- Wang, B., Wu, W., Zheng, W., Liu, Y., & Yin, L. (2020). Recommendation Algorithm of Crowdfunding Platform Based on Collaborative Filtering. *Journal of Physics: Conference Series*, 1673(1), 012030. <https://doi.org/10.1088/1742-6596/1673/1/012030>
- Wang, J., Zhang, X., Hu, L., & Du, C. (2022). Design and Implementation of a Scholarship Information Management System. In Proceedings of the 2022 International Conference on Education and E-Learning (ICEEL 2022) (pp. 24-28). <https://doi.org/10.1145/3600576.3600615>
- Wilinski, R. (2022, April 11). What Is DynamoDB? Ultimate Intro for Beginners. Dynobase. <https://dynobase.dev/what-is-dynamodb/>
- Wood, T. (2020). Unsupervised Learning. DeepAI. <https://deepai.org/machine-learning-glossary-and-terms/unsupervised-learning>
- Yap, J., Lim, J., & Chua, J. (2020). Development of a mobile application using Paymongo API for processing payments for a food delivery service. In Proceedings of the 2020 ACM Southeast Regional Conference on Software Engineering (pp. 1-8). ACM.

- Zabala, B. A., & Gutierrez, M. P. (2017). Economically Deprived and Marginalized Scholars: Their Lifestyles, Experiences, Challenges and Aspirations. OALib, 04(02), 1–14. <https://doi.org/10.4236/oalib.1103395>
- Zhao, Y., Harris, P., & Lam, W. (2019). Crowdfunding industry—History, development, policies, and potential issues. *Journal of Public Affairs*, 19(1), e1921. <https://doi.org/10.1002/pa.1921>
- Zhong, Z. J., & Lin, S. (2017). The antecedents and consequences of charitable donation heterogeneity on social media. *International Journal of Nonprofit and Voluntary Sector Marketing*, 23(1), e1585. <https://doi.org/10.1002/nvsm.1585>

Appendix A

SAMPLE EVALUATION SHEET

**Technological University of the Philippines
College of Science
Computer Studies Department**

Name (Optional): _____ Date: _____

What best describes you? (Student/Philanthropist/Developer): _____

Direction: Please encircle the appropriate number of your rating to evaluate the project entitled “Isko ni Juan: Mobilizing Small-Scale Philanthropy to Finance College Students Using Machine Learning” using the scale below:

4 – Highly Acceptable 3 – Very Acceptable 2 – Acceptable 1 – Not Acceptable

Mobile Application				
Criteria	Rating			
A. Functional Suitability				
1. The mobile application is fit to attain the intended functionalities for the users by providing comprehensive features for campaign creation, secure payment integration, and effective communication. (completeness)	4	3	2	1
2. The mobile application performs its intended functions, which include facilitating donations and matching students with potential donors. (correctness)	4	3	2	1
3. The mobile application meets the specific needs and requirements of students, small-scale philanthropists, and the scholarship scheme in terms of its provided functionalities, ensuring that it is suitable and appropriate for the intended purposes and user expectations. (appropriateness)	4	3	2	1
B. Performance Efficiency				
1. The mobile application is able to process and respond to the user in a timely manner. (time behavior)	4	3	2	1
2. The mobile application effectively utilizes system resources, such as bandwidth, processing power, and memory, to ensure optimal efficiency and appropriate usage. (resource utilization)	4	3	2	1
3. The mobile application can effectively handle a substantial volume of concurrent users and campaigns, ensuring it can handle the expected workload and maintain optimal	4	3	2	1

performance without experiencing any capacity-related limitations. (capacity)				
C. Compatibility				
1. The mobile application does not interfere with other applications or software running on the same device, ensuring that users can use the app alongside other necessary tools without any issues. (co-existence)	4	3	2	1
2. The mobile application integrates smoothly with other necessary tools or services, such as payment gateways or social media platforms, ensuring that users can use the app seamlessly. (interoperability)	4	3	2	1
D. Usability				
1. The mobile application successfully fulfills the specific needs and requirements of users and effectively addresses their desired tasks, goals, and preferences. (appropriateness recognizability)	4	3	2	1
2. The mobile application uses a logical and consistent layout and structure, making it easy for users to navigate the app and understand how its features and functions work. (learnability)	4	3	2	1
3. The mobile application has attributes such as clear, logical, and effective organization of contents that make it easy for the intended users to understand, operate, and control. (operability)	4	3	2	1
4. The mobile application protects users against making errors. On-screen and well-written instructions are available. (user error protection)	4	3	2	1
5. The mobile application consistently delivers a visually pleasing and satisfying user experience by presenting visually appealing design elements, including its color scheme, typography, icons, and overall visual presentation. (user interface aesthetics)	4	3	2	1
6. The mobile application can be used by people with different abilities to attain a specific goal based on their usage. (accessibility)	4	3	2	1
E. Reliability				
1. The mobile application is available and accessible to users at all times, ensuring that users can access the app whenever they need it. (availability)	4	3	2	1
2. The mobile application can prevent or minimize the impact of errors or failures, ensuring that users can continue using the mobile application even in the event of an issue. (fault tolerance)	4	3	2	1
F. Security				
1. The mobile application ensures that all user data, such as personal information and transaction details, are kept confidential and secure. (confidentiality)	4	3	2	1
2. The mobile application prevents unauthorized access to the app by implementing secure authentication mechanisms such as strong password requirements. (integrity)	4	3	2	1

3. The mobile application ensures that users are accountable for their actions and transactions within the app, providing clear records of user activity. (accountability)	4	3	2	1
G. Maintainability				
1. The mobile application provides clear and concise logs and error messages, making it easy to identify and diagnose issues. (analyzability)	4	3	2	1
2. The mobile application can be modified or adapted to accommodate changes in scholarship criteria, donor requirements, or other evolving needs, ensuring efficient and timely updates without compromising the overall stability and quality of the application. (modifiability)	4	3	2	1
H. Portability				
1. The mobile application supports Android smartphone devices using Android Operating System with version 5.0 and above. (adaptability)	4	3	2	1
2. The application can be installed and set up quickly on Android devices without any technical difficulties. (installability)	4	3	2	1

Content-based Recommendation System (Machine Learning)				
Criteria	Rating			
A. Functional Suitability				
1. The recommended campaigns are relevant and appropriate for the target audience. (appropriateness)	4	3	2	1
B. Performance Efficiency				
1. The machine learning algorithm used in the mobile application provides timely and responsive campaign suggestions to philanthropists. (time behavior)	4	3	2	1
C. Compatibility				
1. The machine learning algorithm used in the mobile application coexists harmoniously with other components of the mobile application. (co-existence)	4	3	2	1
2. The machine learning algorithm used in the mobile application seamlessly integrates with the existing infrastructure of the mobile application. (interoperability)	4	3	2	1
D. Usability				
1. The recommendations are presented in a way that is easily comprehensible and meaningful to the users. (understandability)	4	3	2	1

2. The machine learning algorithm used in the mobile application operates smoothly and reliably without frequent glitches or errors. (operability)	4	3	2	1
E. Reliability				
1. The machine learning algorithm used in the mobile application is consistently available and accessible to users when they need it. (availability)	4	3	2	1
F. Security				
1. The machine learning algorithm used in the mobile application guarantees the authenticity of campaign recommendations, ensuring that they are not tampered with. (authenticity)	4	3	2	1
G. Maintainability				
1. The machine learning algorithm used in the mobile application can adapt to changing user preferences, efficient handling of data updates, and responsiveness to bug fixes. (modifiability)	4	3	2	1
H. Portability				
1. The machine learning algorithm used in the mobile application is designed to be adaptable to different platforms and environments.(adaptability)	4	3	2	1

Comments/Suggestions:

Appendix B

USABILITY TEST RESULTS

WELCOME TO ISKO NI JUAN

Your journey towards accessible education starts here. Connect with benefactors and discover scholarships that fit your needs.

Select Your Role

Sign Up

Additional Information for Student

Sign Up

First Name: Jhon Carlo
Middle Name: P
Last Name: Dichoso
Suffix:
Username: Jeycee1231
Email: jeyceedee@gmail.com
Password: ***** >Password Strength: Strong
Repeat Password: ***** Password Strength: Strong

Sex: Male Female
Nationality: Filipino
Birthdate: 12/22/1999
Place of Birth: Caloocan City
Address
Street Address: 143 Little Baguio
City/Municipality: Caloocan City
State/Province: Metro Manila

Place of Birth: Caloocan City
Address
Street Address: 143 Little Baguio
City/Municipality: Caloocan City
State/Province: Metro Manila
Postal/Zip Code: 1800
Next

Keep your account safe
Add your phone number for another layer of security and to receive important messages.
Phone Number: +63 9123456891
By continuing, you agree to the Isko ni Juan terms, acknowledge receipt of our privacy notice and have read the Fundraising Regulator's guidance.

Verify your number
We've sent a verification code to your phone number. Change number
Send new Code
Send Code

Account successfully created!
Proceed to Login

Figure 30. Mobile Application Usability Test Result on Sign Up Process Learnability

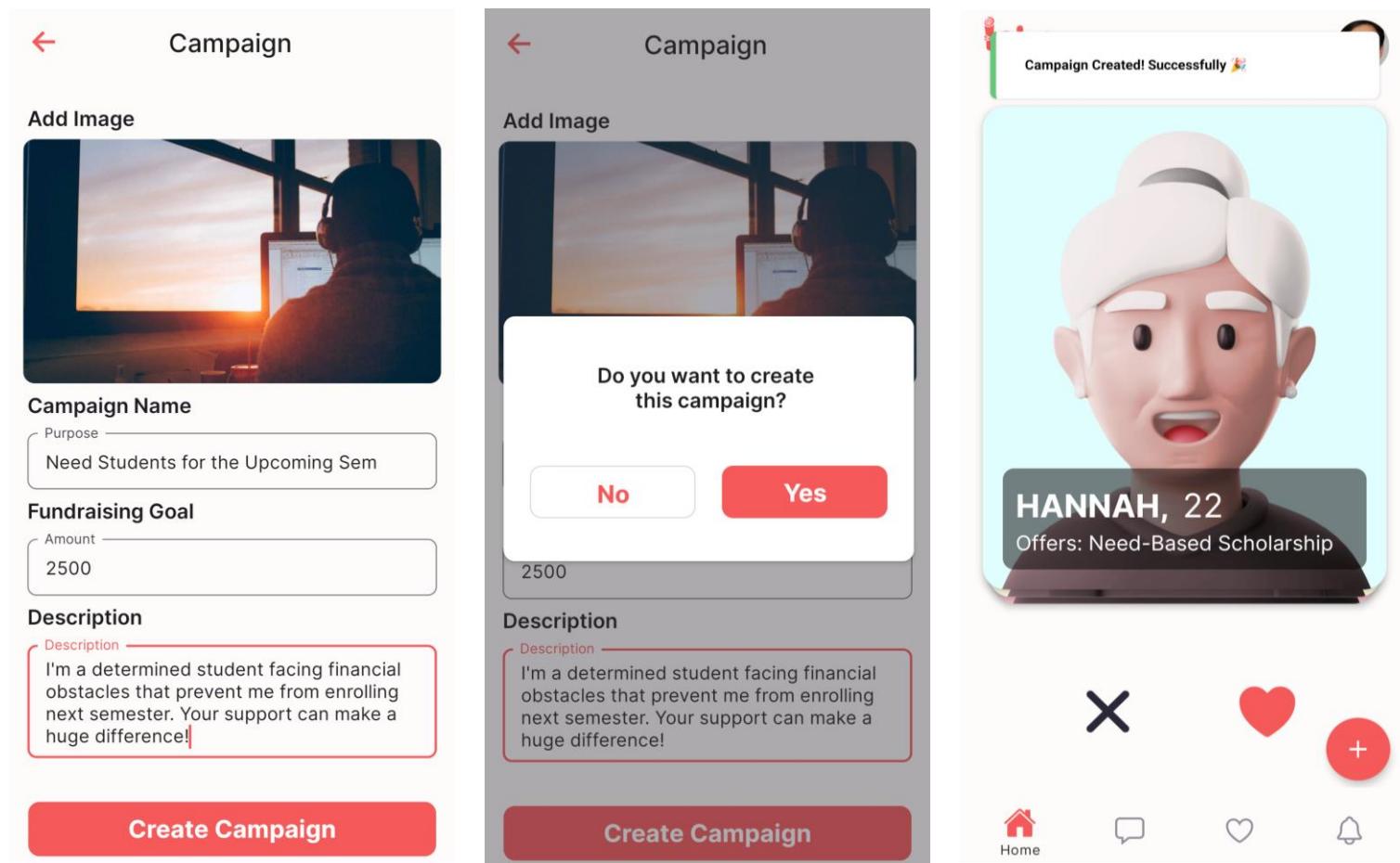


Figure 31. Mobile Application Usability Test Result on Campaign Creation (Learnability)

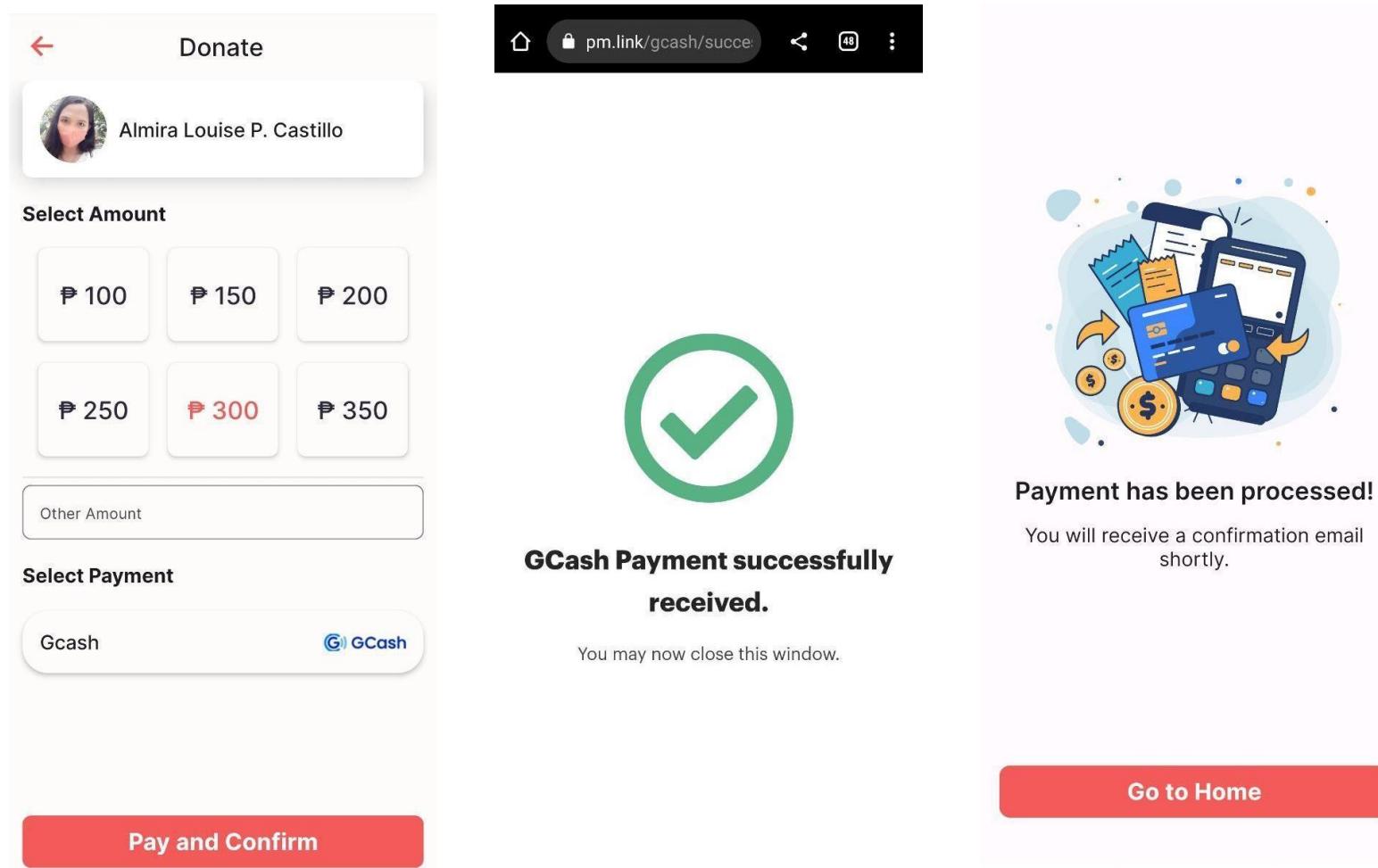


Figure 32. Mobile Application Usability Test Result on Donation Process (Operability)

The image displays two screenshots of the Isko ni Juan mobile application. The left screenshot shows the 'Profile' screen. It features a circular profile picture of a man, with the name 'Carlo P. Dichoso' and the email 'jeyceedee24@gmail.com' displayed next to it. Below this, there's an 'Overview' section with the text 'Hello I am Carlo' and a red edit icon. A 'Account' section includes links for 'Personal Information' and 'Change Password'. Under 'Legal and Policies', there are links for 'Help and Support', 'Privacy and Policy', 'Terms and Conditions', and 'About Us'. A large red 'Logout' button is at the bottom. The right screenshot shows the 'Personal Information' screen, which is divided into sections for 'General', 'Name' (Carlo P. Dichoso), 'Email Address' (jeyceedee24@gmail.com), and 'Phone Number' (+639560275799). Each section has a red edit icon.

Figure 33. Mobile Application Usability Test Result on User Profile (Appropriateness)

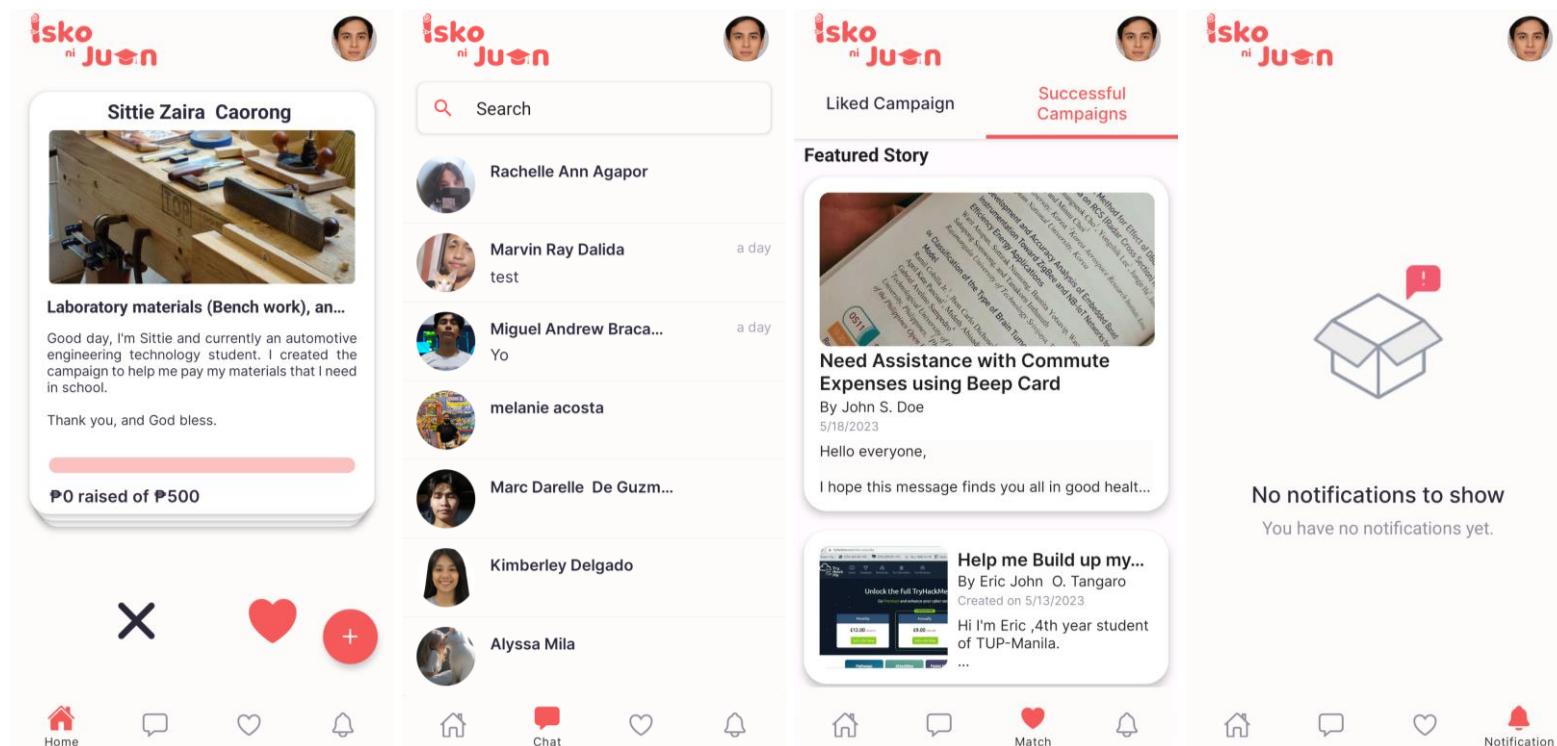


Figure 34. Mobile Application Usability Test Result on Navigation (Operability)

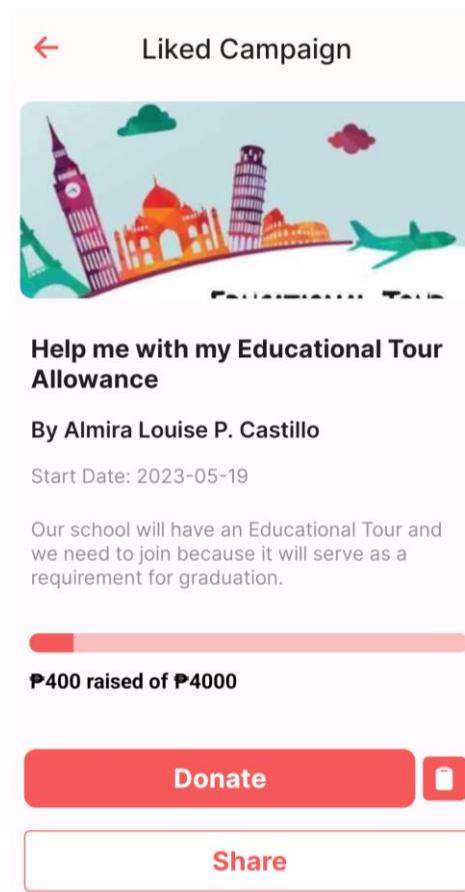


Figure 35. Mobile Application Usability Test Result on Campaign Details (Appropriateness)

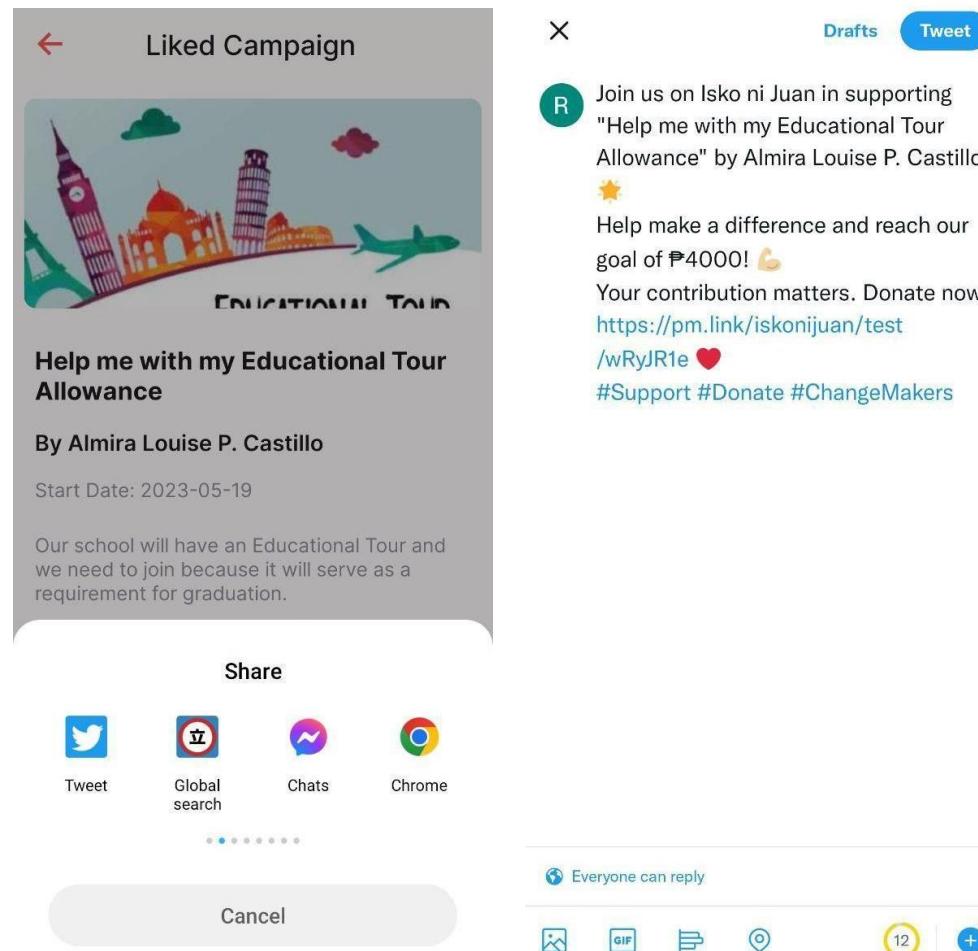


Figure 36. Mobile Application Usability Test Result on Social Sharing (Appropriateness)



Figure 37. Mobile Application Usability Test Result on Notification (Operability)

SECURITY TEST RESULTS

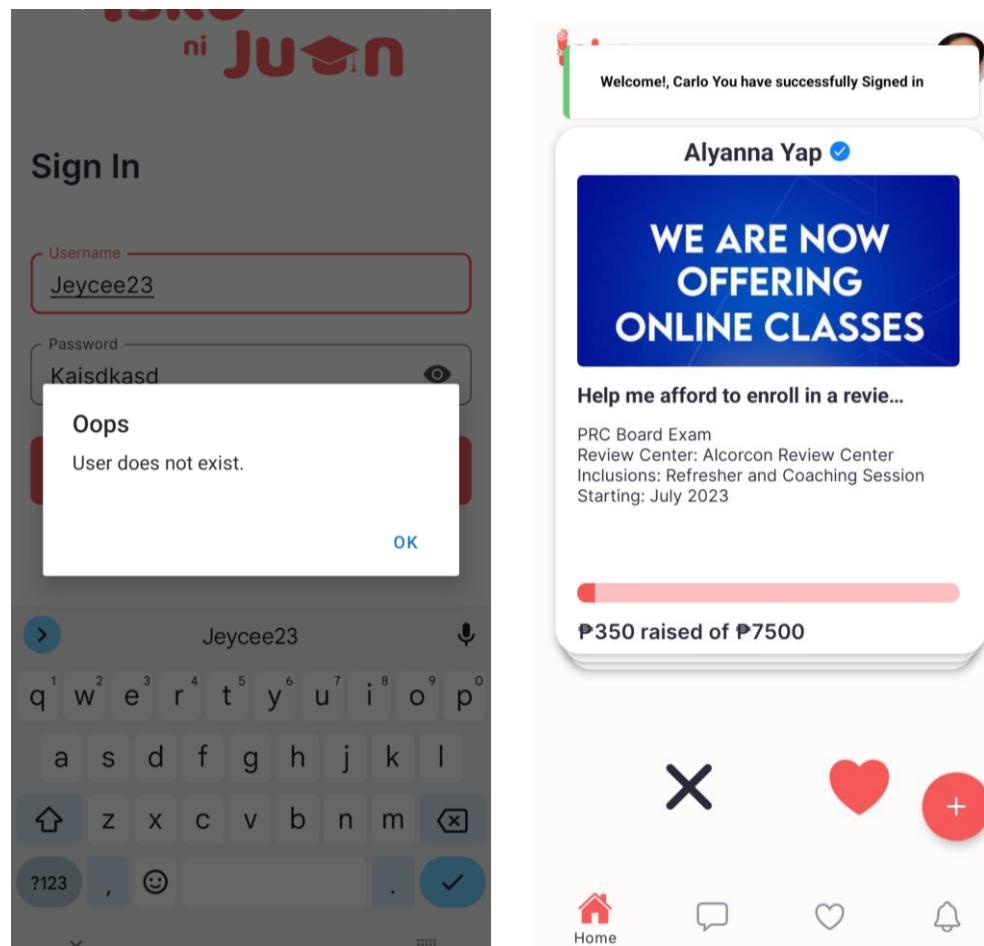


Figure 38. Mobile Application Security Test Result on Login Authentication (Authenticity)

First Name — Jhon Carlo

Middle Name — P

Last Name — Dichoso

Suffix

Username — Jeycee1231

Email — jeyceedee@gmail.com

Password — password

Repeat Password — password

Next

First Name — Jhon Carlo

Middle Name — P

Last Name — Dichoso

Suffix

Username — Jeycee1231

Email — jeyceedee@gmail.com

Password — Password123

Repeat Password — Password123

Next

Figure 39. Mobile Application Security Test Result on Password Strength (Accountability)

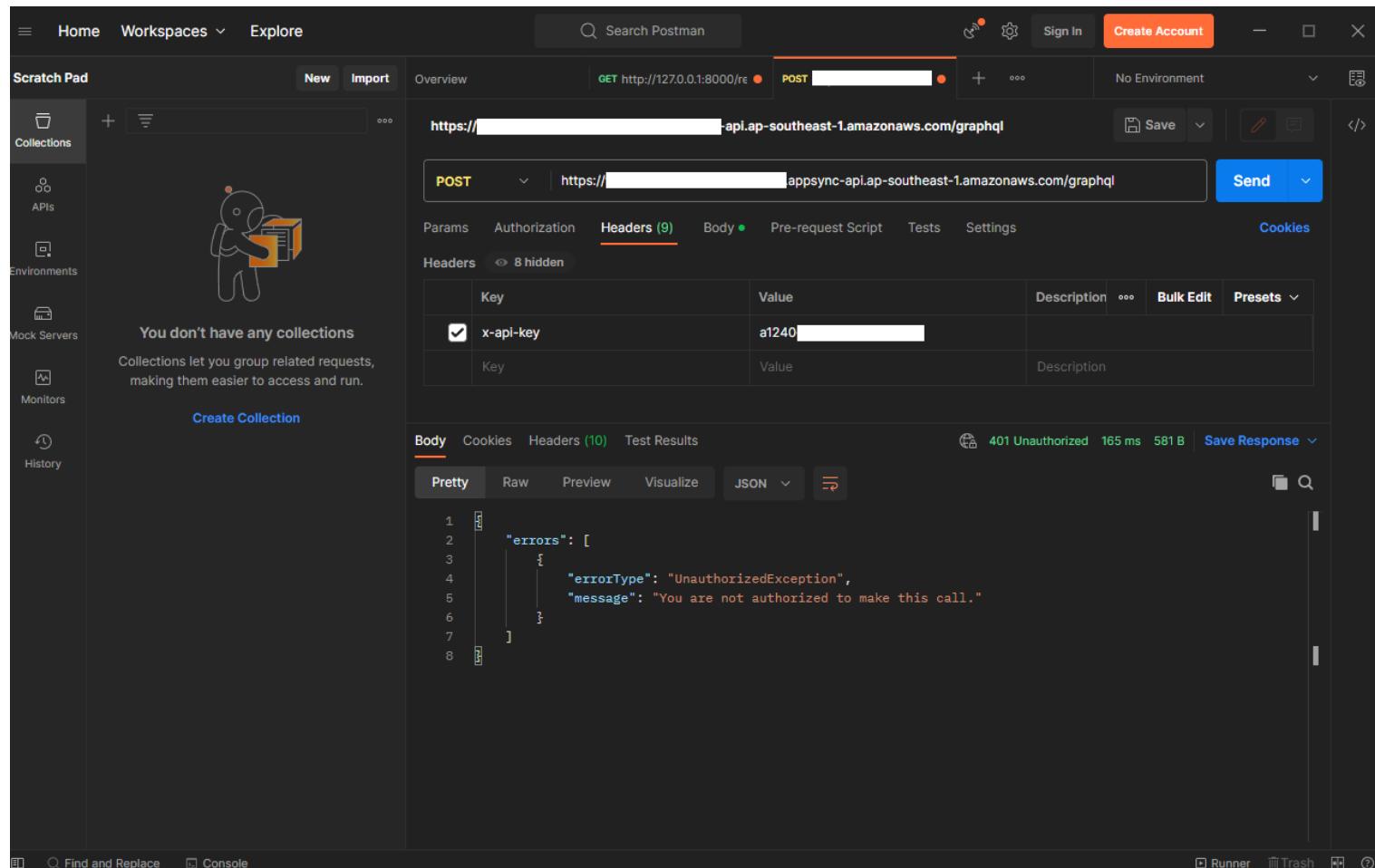


Figure 40. Mobile Application Security Test Result on Privacy Protection (Confidentiality)

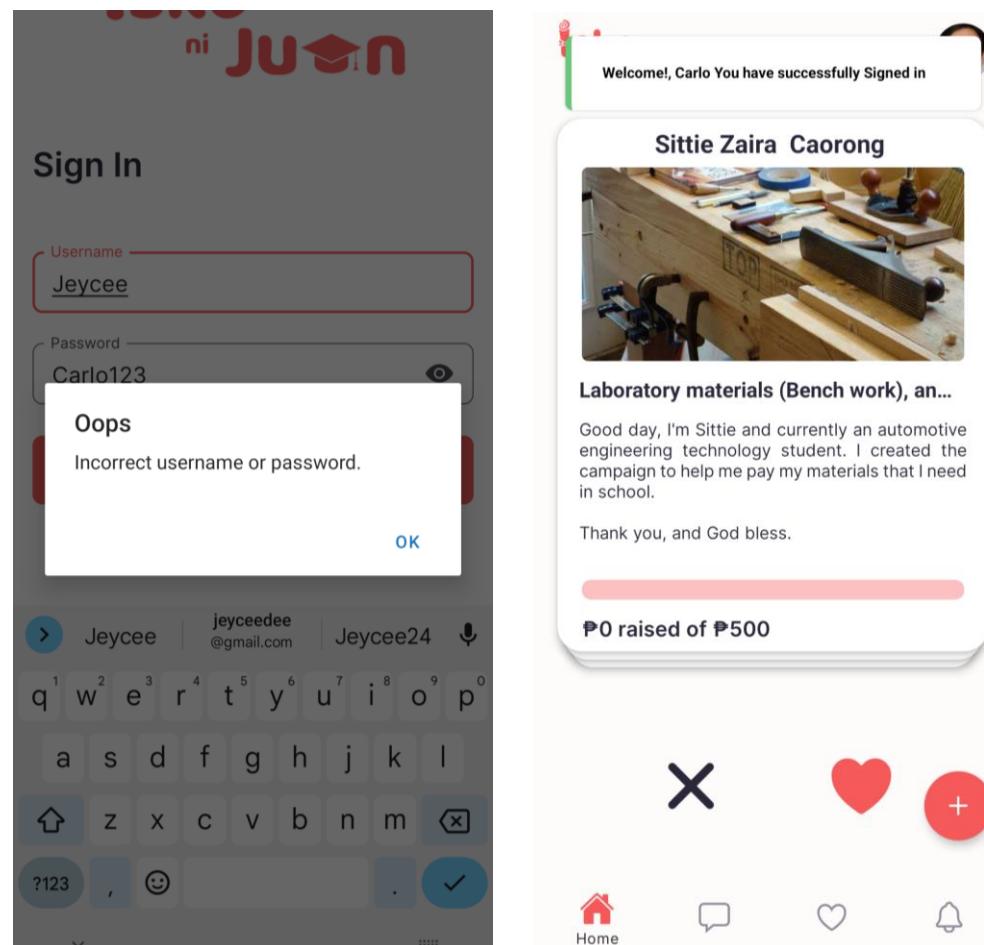


Figure 41. Mobile Application Security Test Result on Authorization and Access (Accountability)

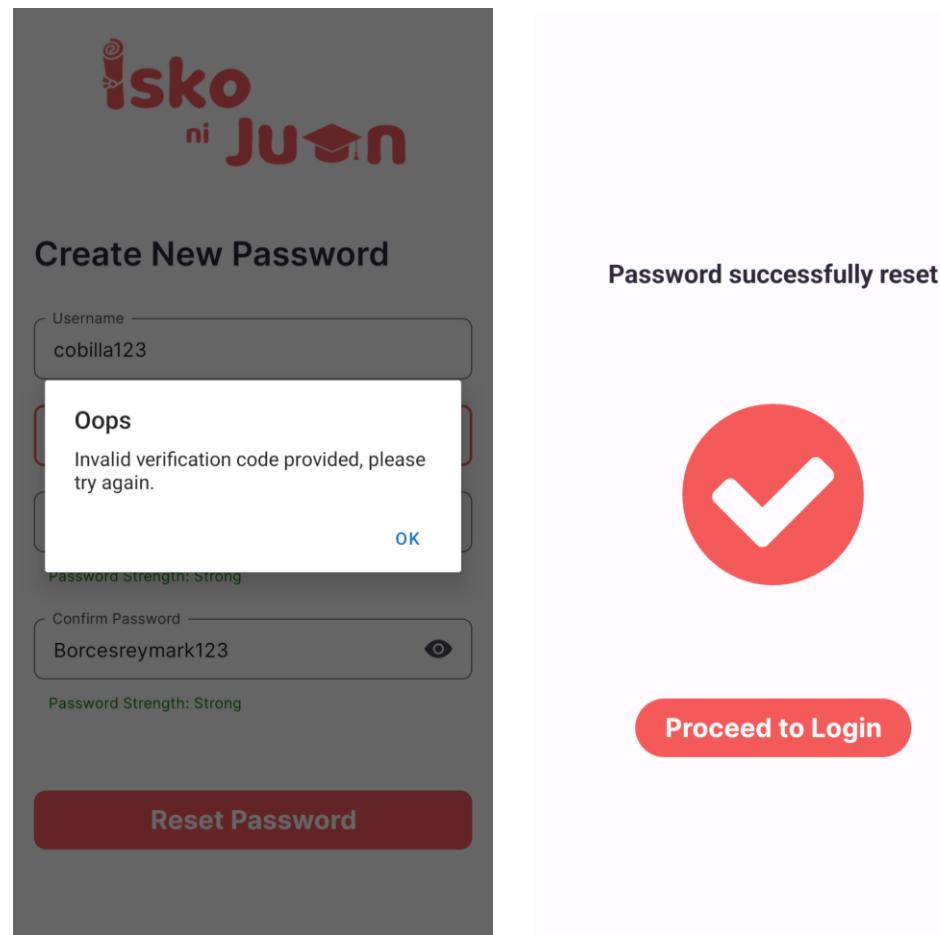


Figure 42. Mobile Application Security Test Result on Password Recovery (Authentication)

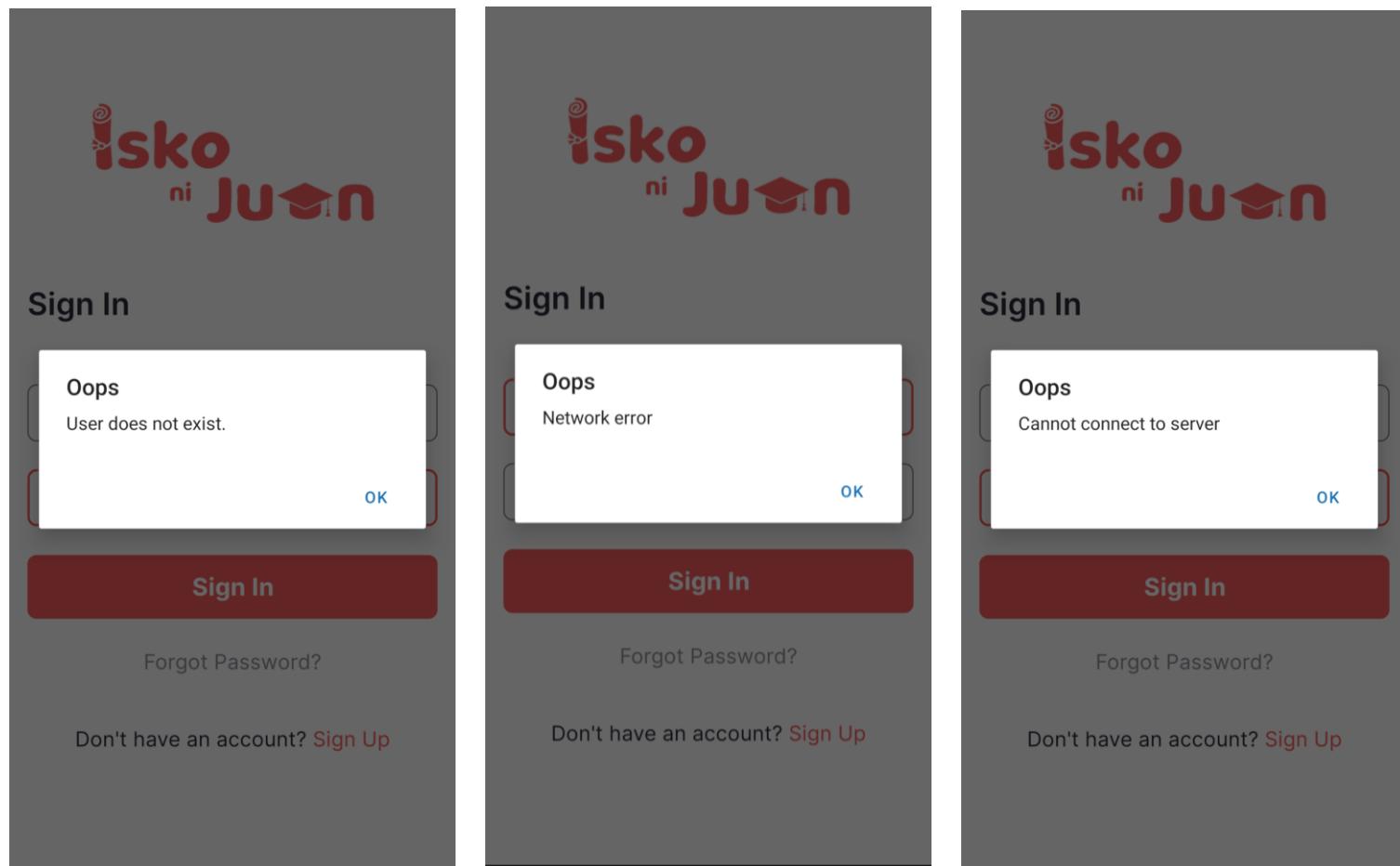


Figure 43. Mobile Application Security Test Result on Error Handling (Integrity)

Appendix C**SURVEY QUESTIONNAIRE AND RESULTS SHEETS**

Evaluation Sheet (Isko ni Juan Mobile App)

Isko ni Juan Mobile Application is a dynamic platform designed to connect students seeking scholarships with small philanthropists. It's an innovative crowdfunding solution for academic expenses. You can download and explore the app on the [Google Play Store](#).

In this section, we're seeking your valuable feedback to evaluate the project "**Isko ni Juan: Mobilizing Small-Scale Philanthropy to Finance College Students Using Machine Learning**". Please rate various aspects of the project on the following scale:

1 – Not Acceptable
2 – Acceptable
3 – Very Acceptable
4 – Highly Acceptable

Your responses will be used strictly for academic purposes, and all data collected will be kept confidential.

alexandreeminion@gmail.com [Switch account](#) 

* Indicates required question

Email *

Your email

Name (Optional):

Your answer

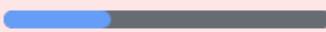
Date of Submission: *

Date

mm/dd/yyyy

What best describes you? *

Choose

Next  Page 1 of 3 **Clear form**

Content-based Recommendation System (Machine Learning)

This section evaluates the content-based recommender system in the "Isko ni Juan" mobile application. The system provides personalized campaign suggestions to philanthropists based on their interests.

We're assessing its functional suitability, performance efficiency, compatibility, usability, reliability, security, and portability. Each aspect is rated on a scale from **1 (Not Acceptable)** to **4 (Highly Acceptable)**.

Your feedback will help improve the system and enhance user experience. Please rate each criterion and share any comments or suggestions. Responses should be in English.

A. Functional Suitability

The recommended campaigns are relevant and appropriate for the target audience. (appropriateness) *

1	2	3	4
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

B. Performance Efficiency

The machine learning algorithm used in the mobile application provides timely and responsive campaign suggestions to benefactors. (time behavior) *

1	2	3	4
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

C. Compatibility

The machine learning algorithm used in the mobile application coexists harmoniously with other components of the mobile application. (co-existence) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The machine learning algorithm used in the mobile application seamlessly integrates with the existing infrastructure of the mobile application. (interoperability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

D. Usability

The recommendations are presented in a way that is easily comprehensible and meaningful to the users. (understandability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The machine learning algorithm used in the mobile application operates smoothly * and reliably without frequent glitches or errors. (operability)

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

E. Reliability

The machine learning algorithm used in the mobile application is consistently available and accessible to users when they need it. (availability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

F. Security

The machine learning algorithm used in the mobile application is designed to ensure authenticity in the selection and presentation of campaigns to benefactors. (authenticity) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

G. Maintainability

The machine learning algorithm used in the mobile application can adapt to changing user preferences, efficient handling of data updates, and responsiveness to bug fixes. (modifiability) *

1 2 3 4

Not Acceptable

Highly Acceptable

H. Portability

The machine learning algorithm used in the mobile application is designed to be adaptable to different platforms and environments.(adaptability) *

1 2 3 4

Not Acceptable

Highly Acceptable

Comments/Suggestions (Optional):

Your answer

[Back](#)[Next](#)

Page 2 of 3

[Clear form](#)

Mobile Application Feedback**A. Functional Suitability**

The mobile application is fit to attain the intended functionalities for the users by * providing comprehensive features for campaign creation, secure payment integration, and effective communication. (functional completeness)

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application performs its intended functions, which include facilitating * donations and matching students with potential donors. (functional correctness)

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application meets the specific needs and requirements of students, * small-scale philanthropists, and the scholarship scheme in terms of its provided functionalities, ensuring that it is suitable and appropriate for the intended purposes and user expectations. (functional appropriateness)

1 2 3 4

Not Acceptable



Highly Acceptable

B. Performance Efficiency

The mobile application is able to process and respond to the user in a timely manner. (time behavior) *

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application effectively utilizes system resources, such as bandwidth, processing power, and memory, to ensure optimal efficiency and appropriate usage. (resource utilization) *

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application can effectively handle a substantial volume of concurrent users and campaign, ensuring it can handle the expected workload and maintain optimal performance without experiencing any capacity-related limitations. (capacity) *

1 2 3 4

Not Acceptable



Highly Acceptable

C. Compatibility

The mobile application does not interfere with other applications or software running on the same device, ensuring that users can use the app alongside other necessary tools without any issues. (co-existence) *

1 2 3 4

Not Acceptable

Highly Acceptable

The mobile application integrates smoothly with other necessary tools or services, such as payment gateways or social media platforms, ensuring that users can use the app seamlessly. (interoperability) *

1 2 3 4

Not Acceptable

Highly Acceptable

D. Usability

The mobile application successfully fulfills the specific needs and requirements of users and effectively addresses their desired tasks, goals, and preferences. (appropriateness recognizability) *

1 2 3 4

Not Acceptable

Highly Acceptable

The mobile application uses a logical and consistent layout and structure, making * it easy for users to navigate the app and understand how its features and functions work. (learnability)

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The mobile application has attributes such as clear, logical, and effective organization of contents that make it easy for the intended users to understand, operate, and control. (operability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The mobile application protects users against making errors. On-screen and well-written instructions are available. (user error protection) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The mobile application consistently delivers a visually pleasing and satisfying user experience by presenting visually appealing design elements, including its color scheme, typography, icons, and overall visual presentation. (user interface aesthetics) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The mobile application can be used by people with different abilities to attain a specific goal based on their usage. (accessibility) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

E. Reliability

The mobile application is available and accessible to users at all times, ensuring that users can access the app whenever they need it. (availability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

The mobile application can prevent or minimize the impact of errors or failures, ensuring that users can continue using the mobile application even in the event of an issue. (fault tolerance) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Highly Acceptable

F. Security

The mobile application ensures that all user data, such as personal information and transaction details, are kept confidential and secure. (confidentiality) *

1 2 3 4

Not Acceptable

Highly Acceptable

The mobile application prevents unauthorized access to the app by implementing secure authentication mechanisms such as strong password requirements. (integrity)

1 2 3 4

Not Acceptable

Highly Acceptable

The mobile application ensures that users are accountable for their actions and transactions within the app, providing clear records of user activity. (accountability)

1 2 3 4

Not Acceptable

Highly Acceptable

G. Maintainability

The mobile application provides clear and concise logs and error messages, making it easy to identify and diagnose issues. (analyzability) *

1 2 3 4

Not Acceptable

Highly Acceptable

The mobile application can be modified or adapted to accommodate changes in scholarship criteria, donor requirements, or other evolving needs, ensuring efficient and timely updates without compromising the overall stability and quality of the application. (modifiability) *

1 2 3 4

Not Acceptable

Highly Acceptable

H. Portability

The mobile application supports Android smartphone devices using Android Operating System with version 5.0 and above. (adaptability) *

1 2 3 4

Not Acceptable

Highly Acceptable

The application can be installed and set up quickly on Android devices without any technical difficulties. (installability) *

1 2 3 4

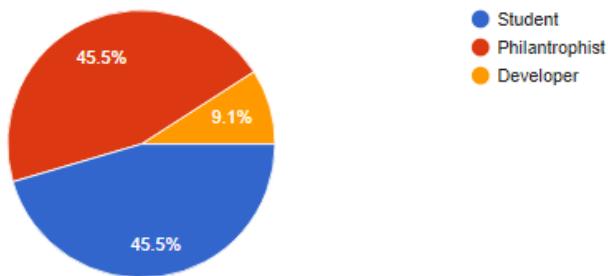
Not Acceptable

Highly Acceptable

What best describes you?

 Copy

110 responses



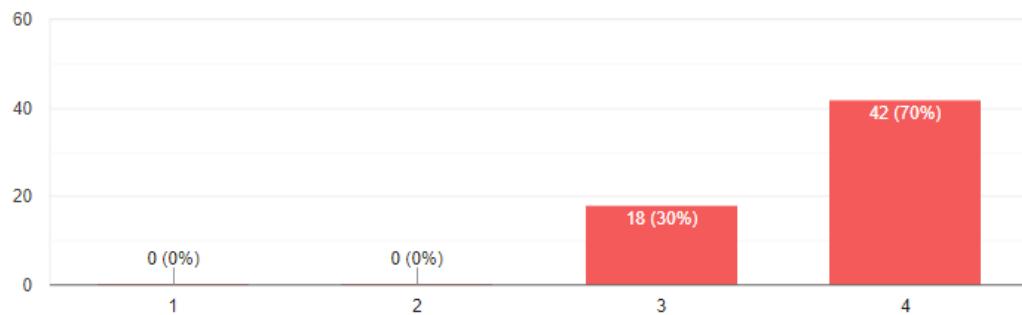
Content-based Recommendation System (Machine Learning)

A. Functional Suitability

The recommended campaigns are relevant and appropriate for the target audience. (appropriateness)

[Copy](#)

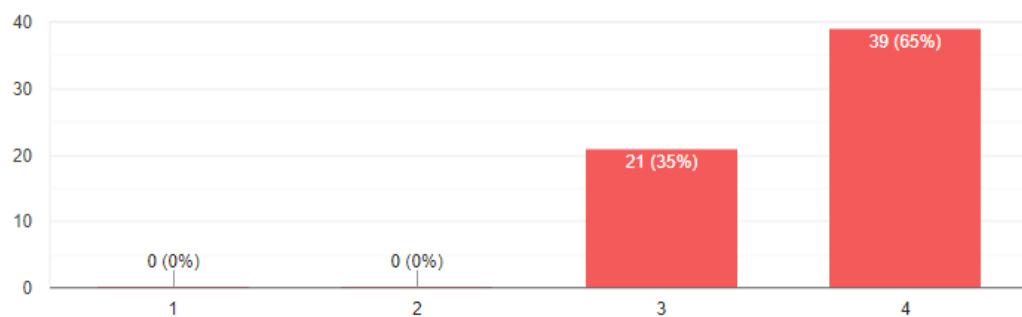
60 responses

**B. Performance Efficiency**

The machine learning algorithm used in the mobile application provides timely and responsive campaign suggestions to benefactors. (time behavior)

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60 responses

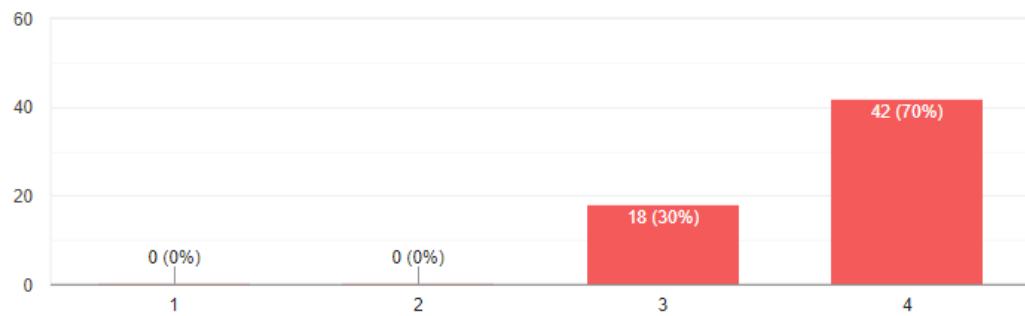


C. Compatibility

The machine learning algorithm used in the mobile application coexists harmoniously with other components of the mobile application. (co-existence)

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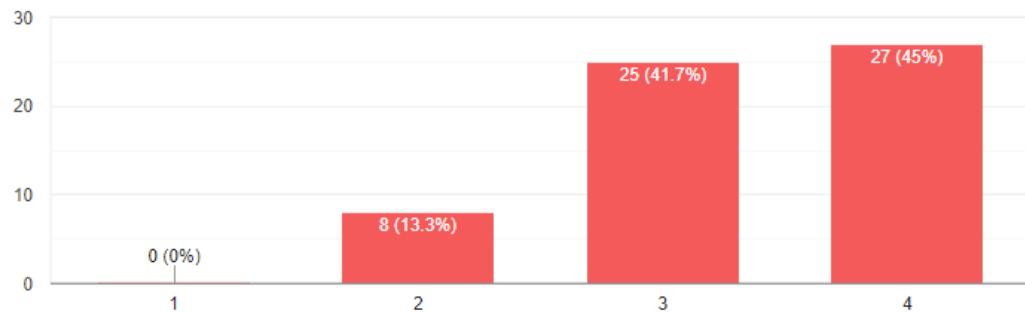
60 responses



The machine learning algorithm used in the mobile application seamlessly integrates with the existing infrastructure of the mobile application. (interoperability)

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60 responses

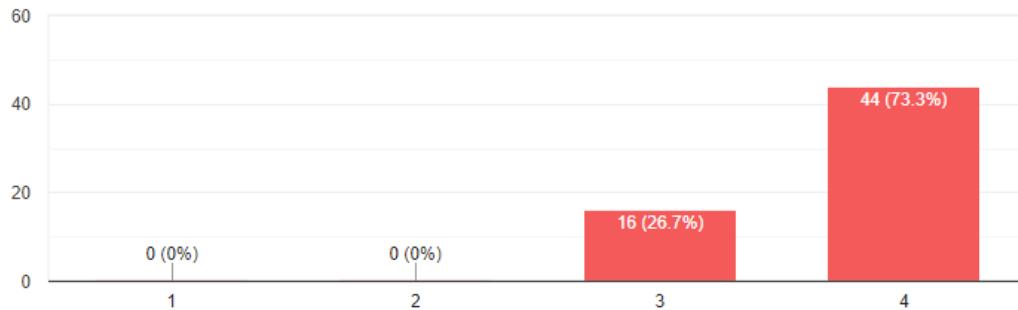


D. Usability

The recommendations are presented in a way that is easily comprehensible and meaningful to the users. (understandability)

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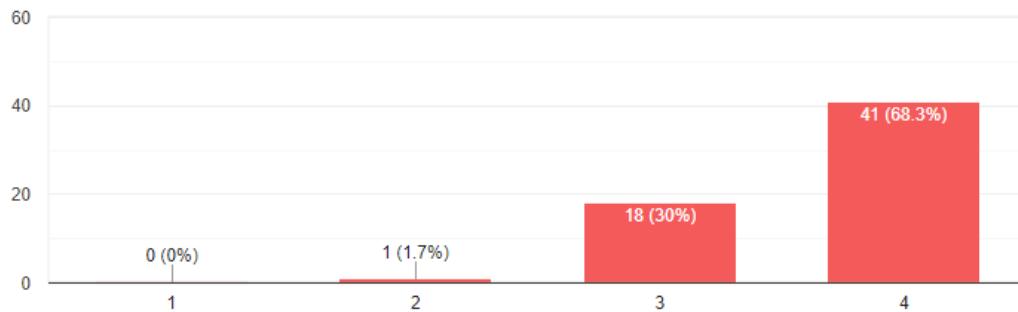
60 responses



The machine learning algorithm used in the mobile application operates smoothly and reliably without frequent glitches or errors. (operability)

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60 responses

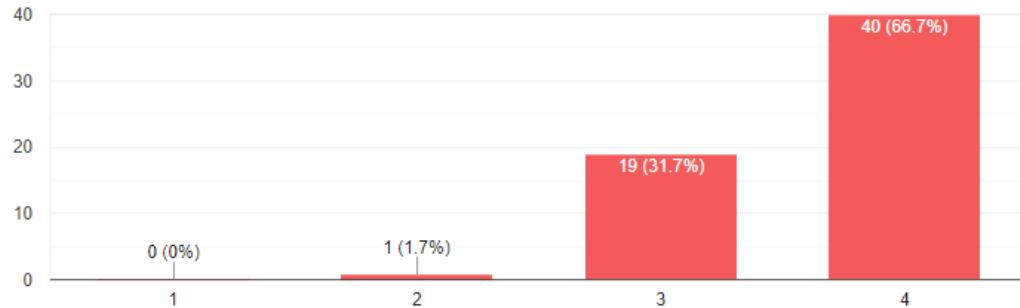


E. Reliability

The machine learning algorithm used in the mobile application is consistently available and accessible to users when they need it. (availability)

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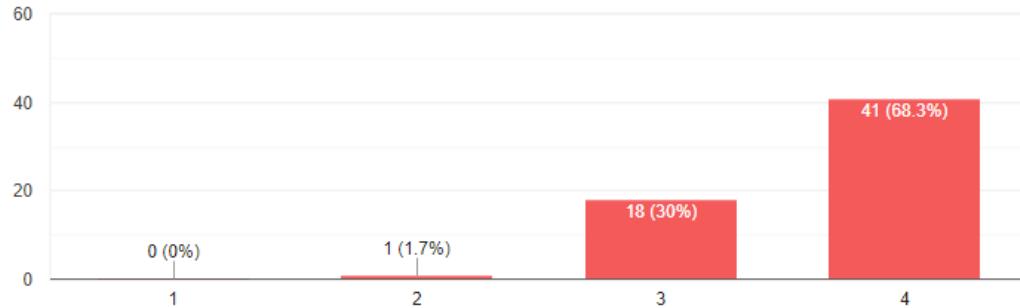
60 responses

**F. Security**

The machine learning algorithm used in the mobile application is designed to ensure authenticity in the selection and presentation of campaigns to benefactors. (authenticity)

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60 responses

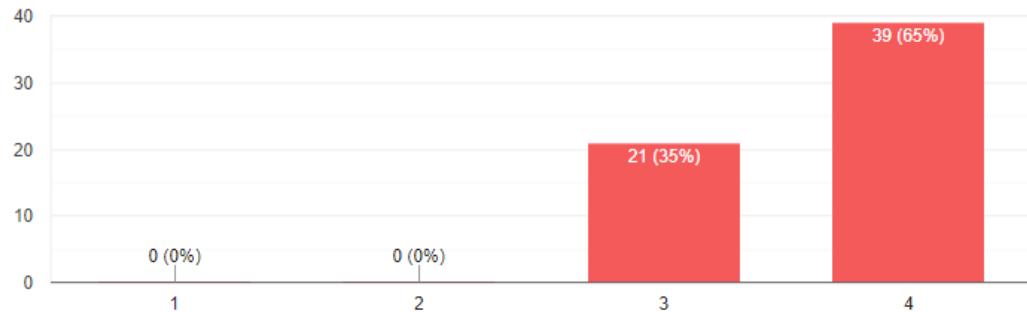


G. Maintainability

The machine learning algorithm used in the mobile application can adapt to changing user preferences, efficient handling of data updates, and responsiveness to bug fixes. (modifiability)

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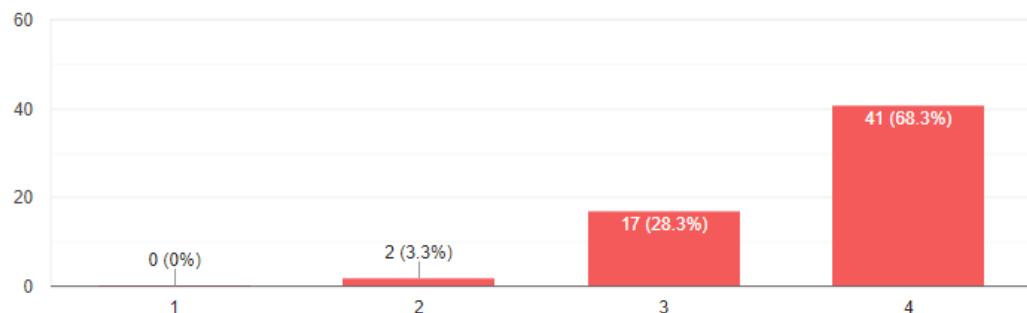
60 responses

**H. Portability**

The machine learning algorithm used in the mobile application is designed to be adaptable to different platforms and environments.(adaptability)

[Copy](#)

60 responses



Comments/Suggestions (Optional):

1 response

The recommendations are good, it can be improved because sometimes there are some irrelevant campaigns in my recommendations.

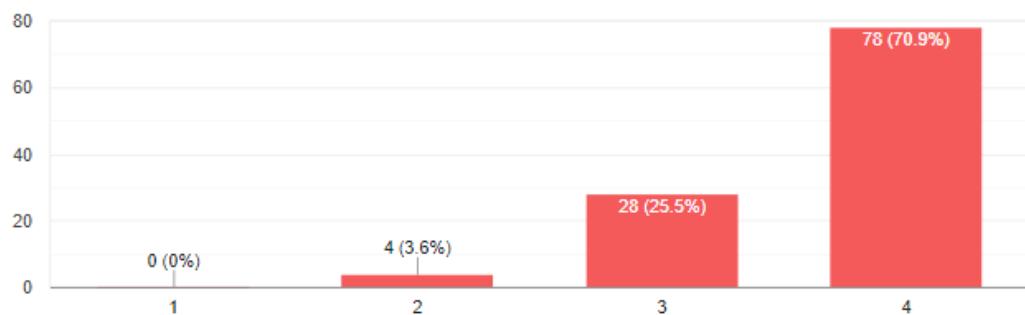
Mobile Application Feedback

A. Functional Suitability

The mobile application is fit to attain the intended functionalities for the users by providing comprehensive features for campaign creation, secure payment integration, and effective communication. (functional completeness)

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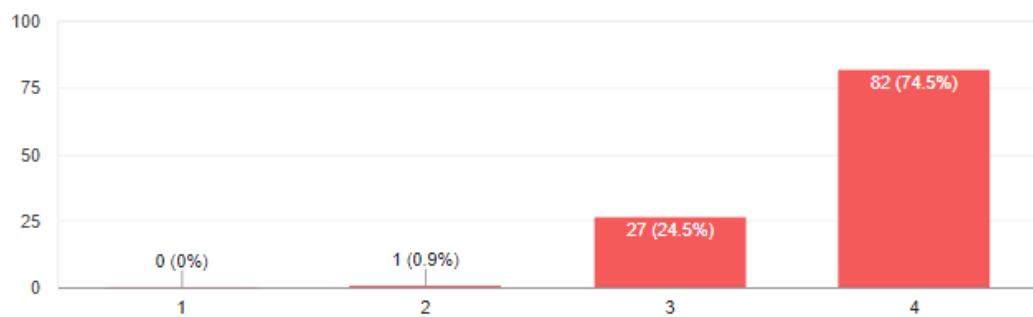
110 responses



The mobile application performs its intended functions, which include facilitating donations and matching students with potential donors. (functional correctness)

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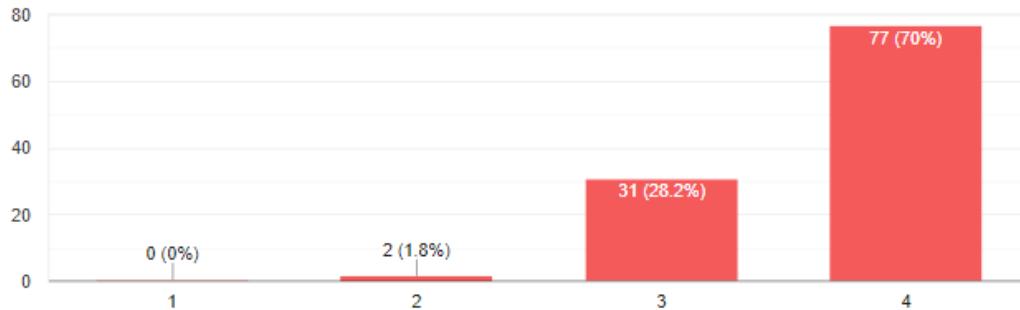
110 responses



The mobile application meets the specific needs and requirements of students, small-scale philanthropists, and the scholarship scheme in terms of its provided functionalities, ensuring that it is suitable and appropriate for the intended purposes and user expectations. (functional appropriateness)

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110 responses

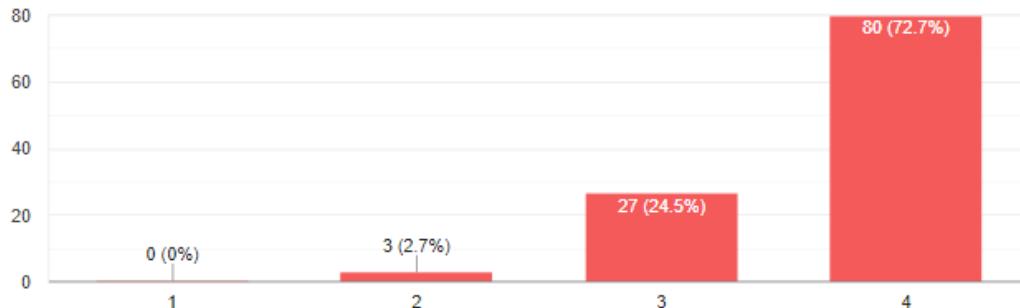


B. Performance Efficiency

The mobile application is able to process and respond to the user in a timely manner. (time behavior)

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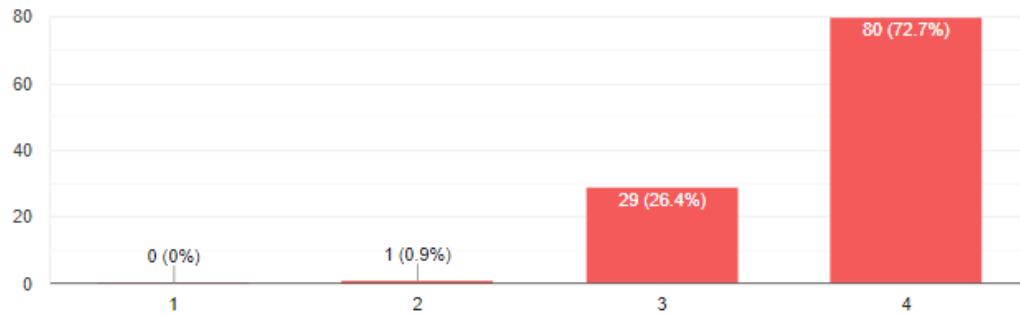
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The mobile application effectively utilizes system resources, such as bandwidth, processing power, and memory, to ensure optimal efficiency and appropriate usage. (resource utilization)

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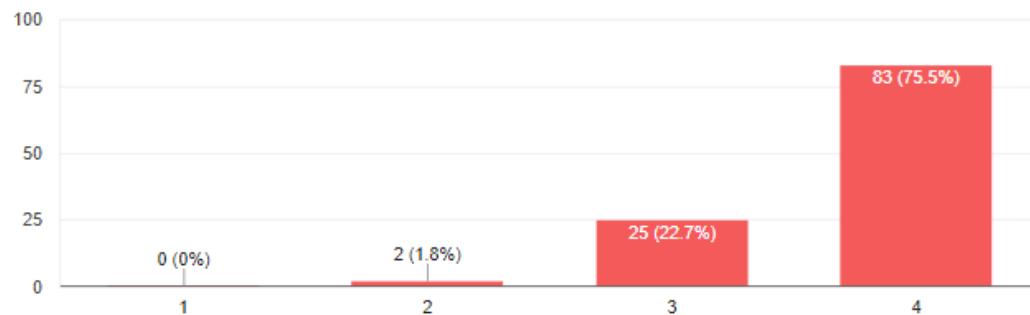
110 responses



The mobile application can effectively handle a substantial volume of concurrent users and campaign, ensuring it can handle the expected workload and maintain optimal performance without experiencing any capacity-related limitations. (capacity)

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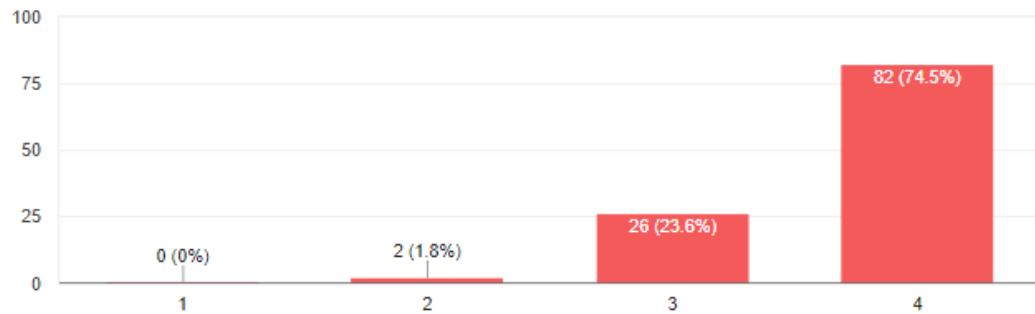


C. Compatibility

The mobile application does not interfere with other applications or software running on the same device, ensuring that users can use the app alongside other necessary tools without any issues. (co-existence)

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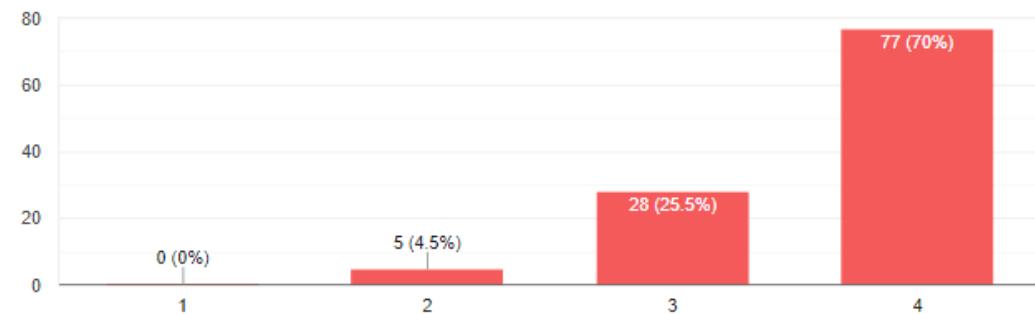
110 responses



The mobile application integrates smoothly with other necessary tools or services, such as payment gateways or social media platforms, ensuring that users can use the app seamlessly. (interoperability)

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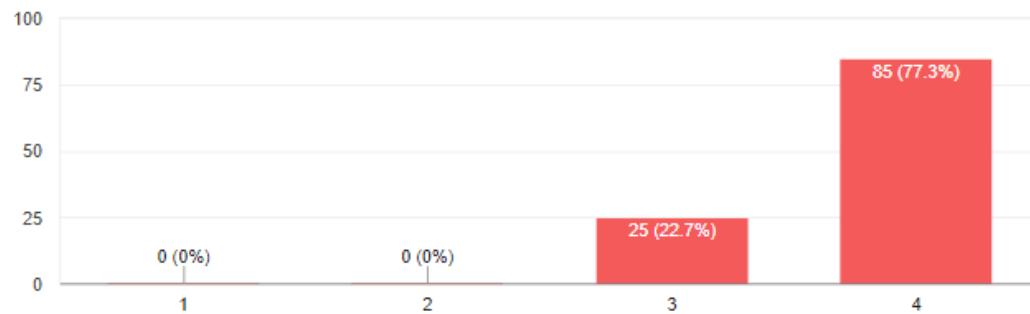


D. Usability

The mobile application successfully fulfills the specific needs and requirements of users and effectively addresses their desired tasks, goals, and preferences. (appropriateness recognizability)

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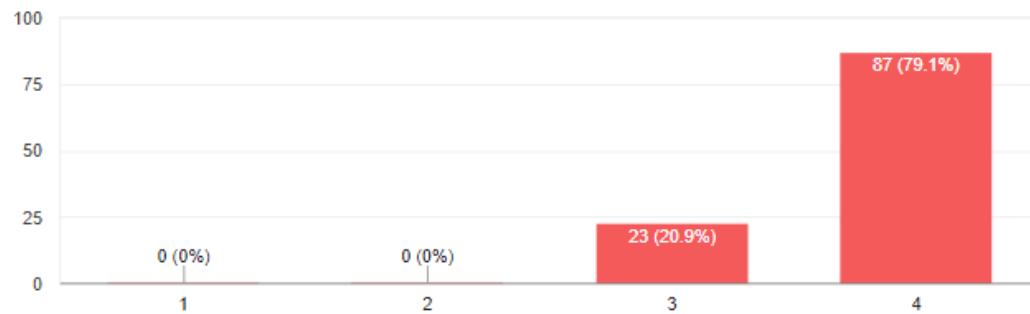
110 responses



The mobile application uses a logical and consistent layout and structure, making it easy for users to navigate the app and understand how its features and functions work. (learnability)

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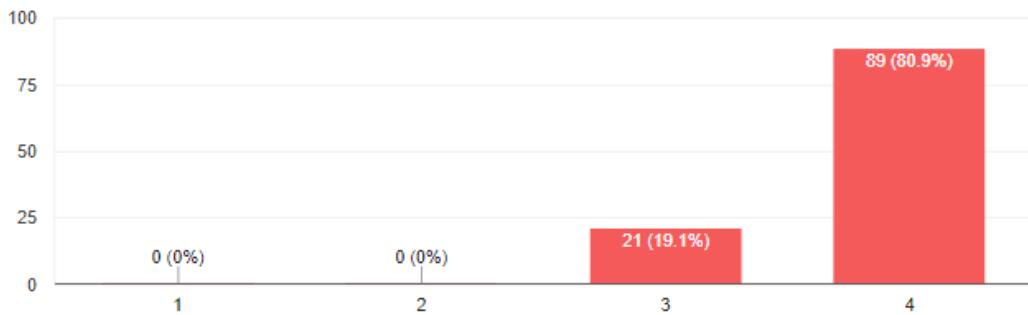
110 responses



The mobile application has attributes such as clear, logical, and effective organization of contents that make it easy for the intended users to understand, operate, and control. (operability)

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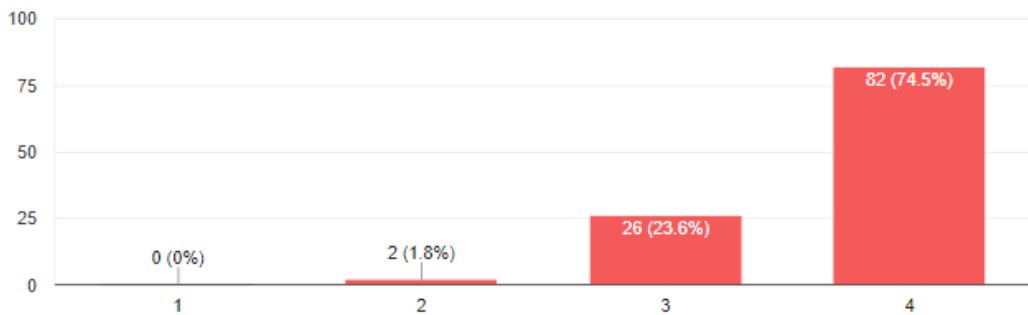
110 responses



The mobile application protects users against making errors. On-screen and well-written instructions are available. (user error protection)

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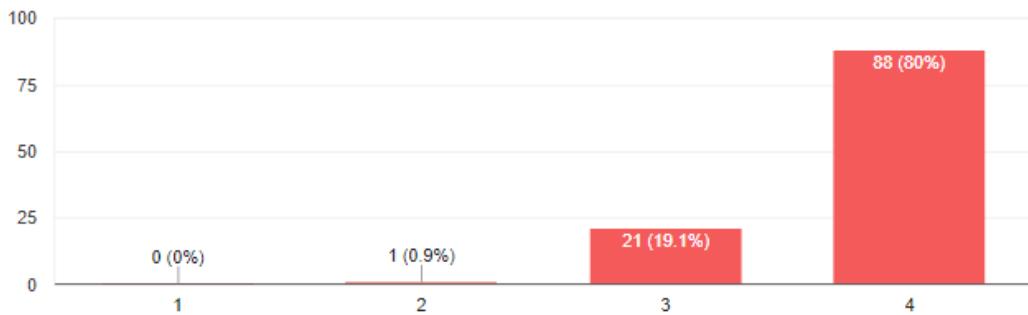
110 responses



The mobile application consistently delivers a visually pleasing and satisfying user experience by presenting visually appealing design elements, including its color scheme, typography, icons, and overall visual presentation. (user interface aesthetics)

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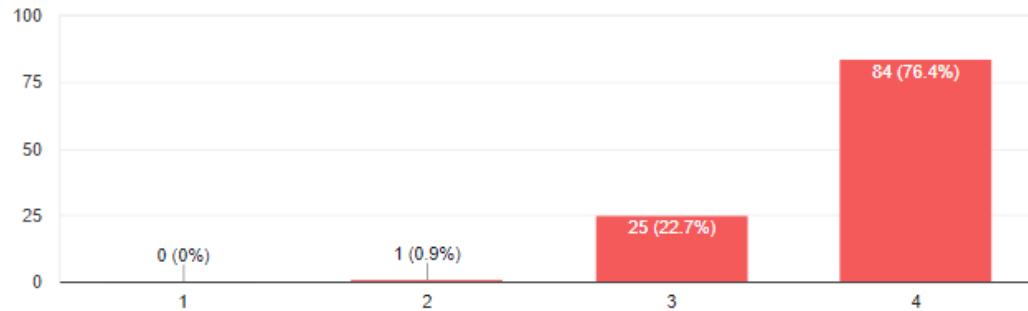
110 responses



The mobile application can be used by people with different abilities to attain a specific goal based on their usage. (accessibility)

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110 responses

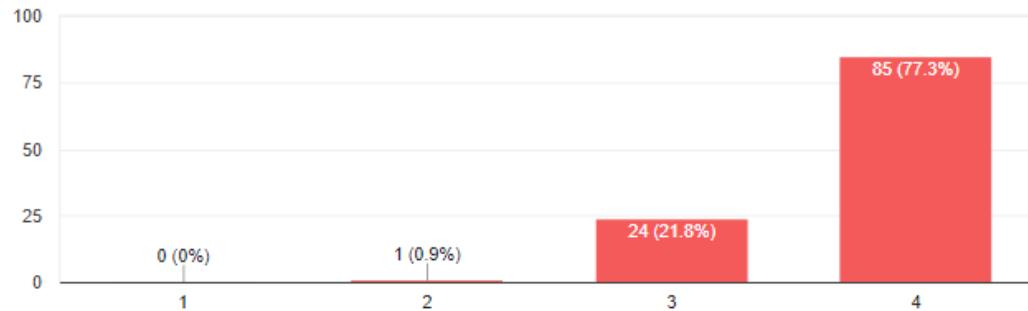


E. Reliability

The mobile application is available and accessible to users at all times, ensuring that users can access the app whenever they need it. (availability)

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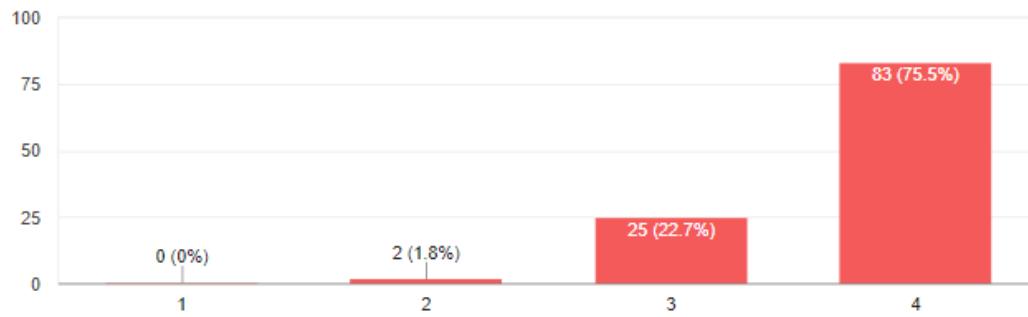
110 responses



The mobile application can prevent or minimize the impact of errors or failures, ensuring that users can continue using the mobile application even in the event of an issue. (fault tolerance)

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110 responses

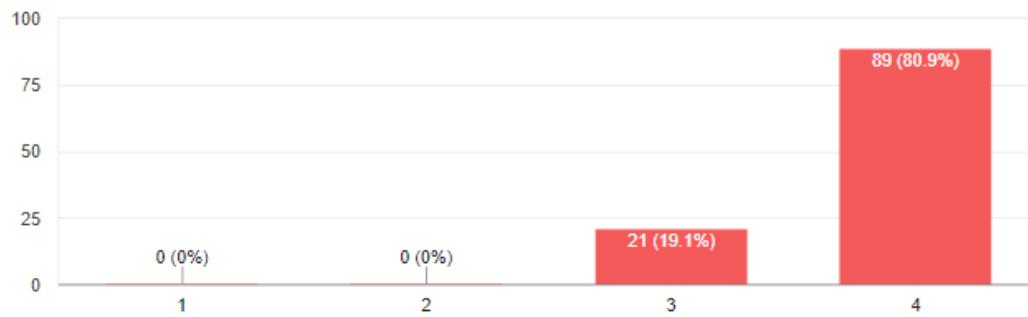


F. Security

The mobile application ensures that all user data, such as personal information and transaction details, are kept confidential and secure. (confidentiality)

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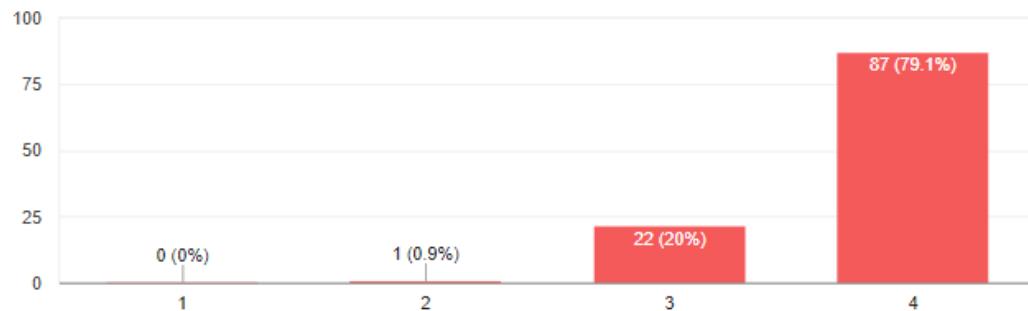
110 responses



The mobile application prevents unauthorized access to the app by implementing secure authentication mechanisms such as strong password requirements. (integrity)

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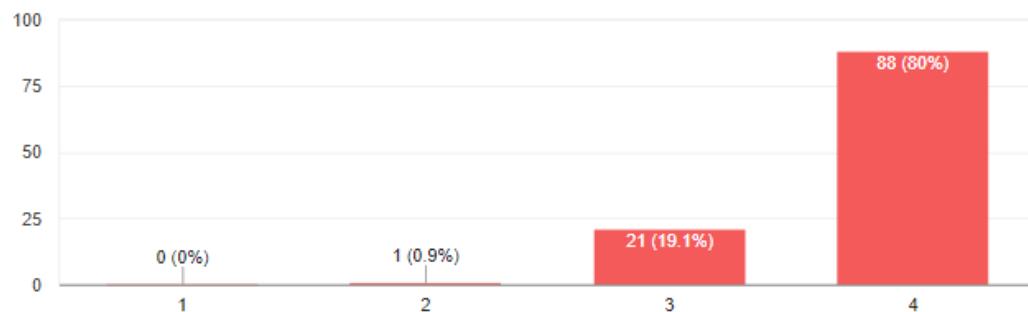
110 responses



The mobile application ensures that users are accountable for their actions and transactions within the app, providing clear records of user activity. (accountability)

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110 responses

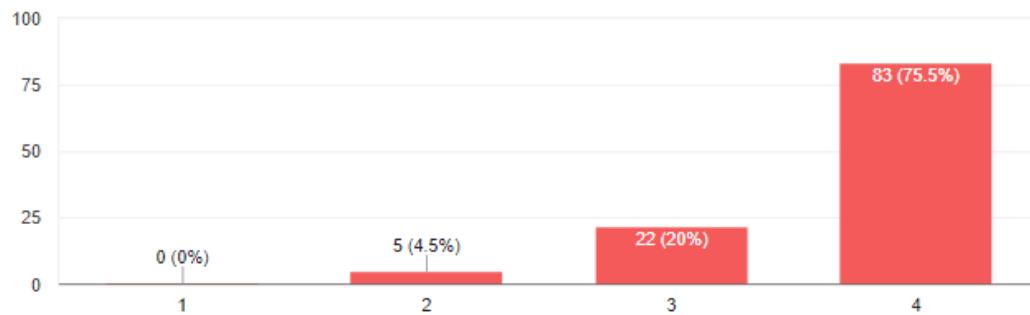


G. Maintainability

The mobile application provides clear and concise logs and error messages, making it easy to identify and diagnose issues. (analyzability)

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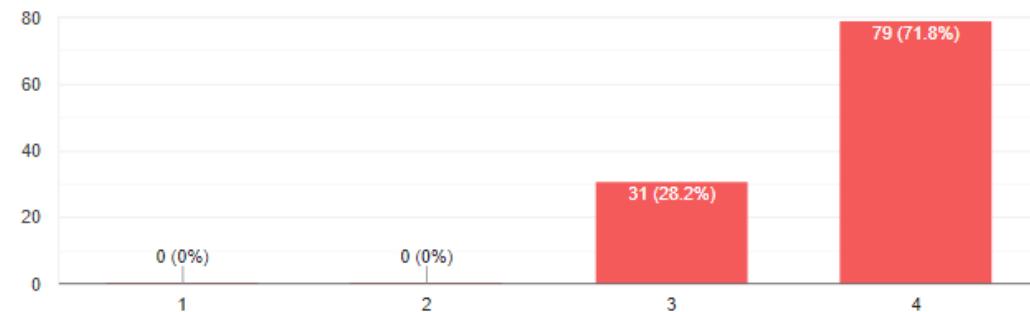
110 responses



The mobile application can be modified or adapted to accommodate changes in scholarship criteria, donor requirements, or other evolving needs, ensuring efficient and timely updates without compromising the overall stability and quality of the application. (modifiability)

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110 responses

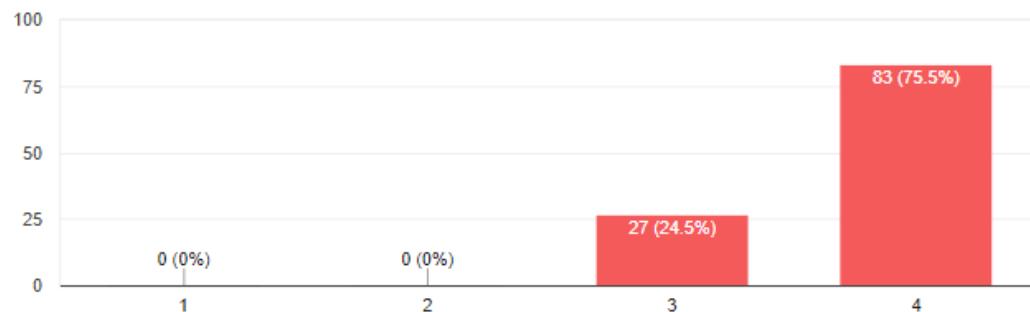


H. Portability

The mobile application supports Android smartphone devices using Android Operating System with version 5.0 and above. (adaptability)

[Copy](#)

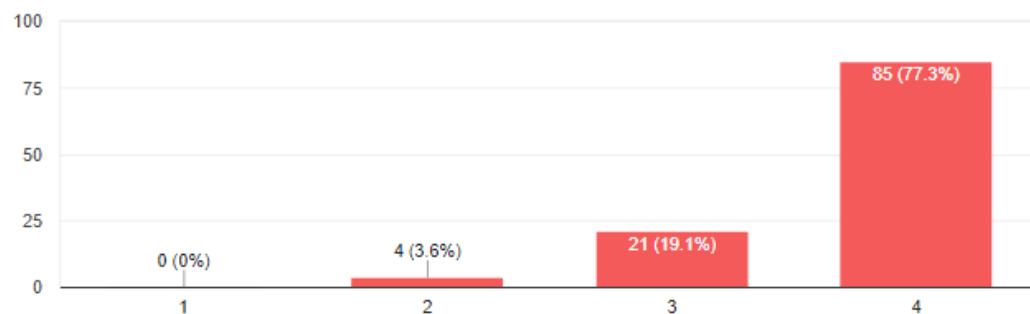
110 responses



The application can be installed and set up quickly on Android devices without any technical difficulties. (installability)

[Copy](#)

110 responses



Comments/Suggestions (Optional):

7 responses

None. For me this app is highly recommended.

It is important to ensure that all validations are fully functional and operating as expected. Please review and test the validation processes to guarantee their effectiveness and accuracy.

Please make the profile picture changeable

Kudos to the Isko ni Juan System Development Team for creating an incredible system! It impressively performs, delivers essential functionality, and is user-friendly. This system's financial support aids Filipino students, making a positive impact on their educational journey.

When logging in, I messed up on inputting the username, when I tried to change it, it seems that I need to erase all (since the mistake I had is the first letter) to be able to change what I inputted. Then, in the notifications panel, I clicked the notifications as read however, when I move to another panel (Home), the notification indicator (how many unread notifications are there) does not update in the first change of panel. And also, if I am going to donate money, there's no option for that.

Never stop testing repetitively and find the bugs even the smallest ones.

Comments/Suggestions (Optional):

7 responses

It is important to ensure that all validations are fully functional and operating as expected. Please review and test the validation processes to guarantee their effectiveness and accuracy.

Please make the profile picture changeable

Kudos to the Isko ni Juan System Development Team for creating an incredible system! It impressively performs, delivers essential functionality, and is user-friendly. This system's financial support aids Filipino students, making a positive impact on their educational journey.

When logging in, I messed up on inputting the username, when I tried to change it, it seems that I need to erase all (since the mistake I had is the first letter) to be able to change what I inputted. Then, in the notifications panel, I clicked the notifications as read however, when I move to another panel (Home), the notification indicator (how many unread notifications are there) does not update in the first change of panel. And also, if I am going to donate money, there's no option for that.

Never stop testing repetitively and find the bugs even the smallest ones.

This application has the potential for crowdfunding use, and I foresee numerous use cases that could greatly benefit students.

Appendix D**SAMPLE ANSWERED EVALUATION SHEET****Evaluation Sheet (Isko ni Juan Mobile App)**

Isko ni Juan Mobile Application is a dynamic platform designed to connect students seeking scholarships with small philanthropists. It's an innovative crowdfunding solution for academic expenses. You can download and explore the app on the [Google Play Store](#).

In this section, we're seeking your valuable feedback to evaluate the project "**Isko ni Juan: Mobilizing Small-Scale Philanthropy to Finance College Students Using Machine Learning**". Please rate various aspects of the project on the following scale:

- 1 – Not Acceptable**
- 2 – Acceptable**
- 3 – Very Acceptable**
- 4 – Highly Acceptable**

Your responses will be used strictly for academic purposes, and all data collected will be kept confidential.

* Indicates required question

Email *

hannahliquirannn@gmail.com

Name (Optional):

Date of Submission: *

MM DD YYYY

05 / 21 / 2023

What best describes you? *

Philanthropist

Content-based Recommendation System (Machine Learning)

This section evaluates the content-based recommender system in the "Isko ni Juan" mobile application. The system provides personalized campaign suggestions to philanthropists based on their interests.

We're assessing its functional suitability, performance efficiency, compatibility, usability, reliability, security, and portability. Each aspect is rated on a scale from 1 (Not Acceptable) to 4 (Highly Acceptable).

Your feedback will help improve the system and enhance user experience. Please rate each criterion and share any comments or suggestions. Responses should be in English.

A. Functional Suitability

The recommended campaigns are relevant and appropriate for the target audience. *
(appropriateness)

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

B. Performance Efficiency

The machine learning algorithm used in the mobile application provides timely and responsive campaign suggestions to benefactors. (time behavior) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

C. Compatibility

The machine learning algorithm used in the mobile application coexists harmoniously with other components of the mobile application. (co-existence) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

The machine learning algorithm used in the mobile application seamlessly integrates with the existing infrastructure of the mobile application. (interoperability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

D. Usability

The recommendations are presented in a way that is easily comprehensible and meaningful to the users. (understandability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The machine learning algorithm used in the mobile application operates smoothly and reliably without frequent glitches or errors. (operability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

E. Reliability

The machine learning algorithm used in the mobile application is consistently available and accessible to users when they need it. (availability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

F. Security

The machine learning algorithm used in the mobile application is designed to ensure authenticity in * the selection and presentation of campaigns to benefactors. (authenticity)

**G. Maintainability**

The machine learning algorithm used in the mobile application can adapt to changing user preferences, efficient handling of data updates, and responsiveness to bug fixes. (modifiability) *

**H. Portability**

The machine learning algorithm used in the mobile application is designed to be adaptable to different platforms and environments.(adaptability) *



Comments/Suggestions (Optional):

Mobile Application Feedback**A. Functional Suitability**

The mobile application is fit to attain the intended functionalities for the users by providing comprehensive features for campaign creation, secure payment integration, and effective communication. (functional completeness) *

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application performs its intended functions, which include facilitating donations and matching students with potential donors. (functional correctness) *

1 2 3 4

Not Acceptable



Highly Acceptable

The mobile application meets the specific needs and requirements of students, small-scale philanthropists, and the scholarship scheme in terms of its provided functionalities, ensuring that it is suitable and appropriate for the intended purposes and user expectations. (functional appropriateness) *

1 2 3 4

Not Acceptable



Highly Acceptable

B. Performance Efficiency

The mobile application is able to process and respond to the user in a timely manner. (time behavior) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application effectively utilizes system resources, such as bandwidth, processing power, and memory, to ensure optimal efficiency and appropriate usage. (resource utilization) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application can effectively handle a substantial volume of concurrent users and campaign, ensuring it can handle the expected workload and maintain optimal performance without experiencing any capacity-related limitations. (capacity) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

C. Compatibility

The mobile application does not interfere with other applications or software running on the same device, ensuring that users can use the app alongside other necessary tools without any issues. (co-existence) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application integrates smoothly with other necessary tools or services, such as payment gateways or social media platforms, ensuring that users can use the app seamlessly. (interoperability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

D. Usability

The mobile application successfully fulfills the specific needs and requirements of users and effectively addresses their desired tasks, goals, and preferences. (appropriateness recognizability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application uses a logical and consistent layout and structure, making it easy for users to navigate the app and understand how its features and functions work. (learnability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application has attributes such as clear, logical, and effective organization of contents that make it easy for the intended users to understand, operate, and control. (operability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application protects users against making errors. On-screen and well-written instructions are available. (user error protection) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application consistently delivers a visually pleasing and satisfying user experience by presenting visually appealing design elements, including its color scheme, typography, icons, and overall visual presentation. (user interface aesthetics) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

The mobile application can be used by people with different abilities to attain a specific goal based on their usage. (accessibility) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Highly Acceptable

E. Reliability

The mobile application is available and accessible to users at all times, ensuring that users can access the app whenever they need it. (availability) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

The mobile application can prevent or minimize the impact of errors or failures, ensuring that users can continue using the mobile application even in the event of an issue. (fault tolerance) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

F. Security

The mobile application ensures that all user data, such as personal information and transaction details, are kept confidential and secure. (confidentiality) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

The mobile application prevents unauthorized access to the app by implementing secure authentication mechanisms such as strong password requirements. (integrity) *

1	2	3	4	
Not Acceptable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Highly Acceptable

The mobile application ensures that users are accountable for their actions and transactions within the app, providing clear records of user activity. (accountability) *



G. Maintainability

The mobile application provides clear and concise logs and error messages, making it easy to identify and diagnose issues. (analyzability) *



The mobile application can be modified or adapted to accommodate changes in scholarship criteria, donor requirements, or other evolving needs, ensuring efficient and timely updates without compromising the overall stability and quality of the application. (modifiability) *



H. Portability

The mobile application supports Android smartphone devices using Android Operating System with * version 5.0 and above. (adaptability)

1 2 3 4

Not Acceptable

Highly Acceptable

The application can be installed and set up quickly on Android devices without any technical difficulties. (installability) *

1 2 3 4

Not Acceptable

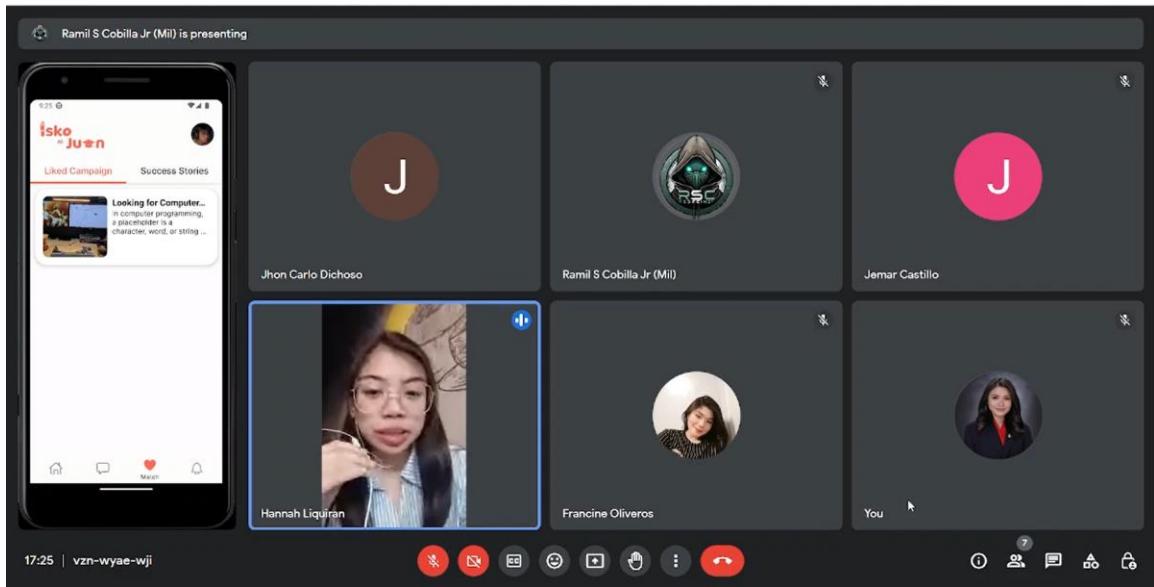
Highly Acceptable

Comments/Suggestions (Optional):

Submitted 5/21/23, 9:07PM

Appendix E

EVALUATOR HIGHLIGHTS



1. TULAY Philippines

Ms. Hannah Liquiran - TULAY Philippines (May 6, 2023)

TULAY PHILIPPINES PROPOSAL.mp4, 24:34 - 26:53

“Actually, habang nakikinig kami kanina, uh... Okay ‘yung ano, ‘yung ganitong app. I agree na i-relate doon sa sinasabi mo kanina na ‘yung mataas ‘yung standards pagdating sa pagbibigay ng help or doon sa mga scholarships sa students kasi dito sa Tulay Philippines, isa sa heart ng organization is may naging project na rin kasi kami na nag-help kami sa students. Actually, ‘yon ‘yung forte ng Tulay Philippines, ‘yung nagpapa-aran kami and hindi kami... wala kaming I mean mataas na standard, wala kaming standard, actually. Kung sino ‘yung nag-fill out sa form namin na nag-a-ask for scholarship, nire-review lang namin siya, bine-based lang naman ‘yung pagbibigay sa prioritization kung paa- kung gaano ito kailangan ng student ngayon or kaya pa ba na ma-wait ‘yung scholarship until next sem. Parang gano’n lang ‘yung basehan namin or criteria namin sa

pagbibigay ng scholarship sa student and I think 'yung ganitong, 'yung ganitong app, 'yung gan'tong initiative, okay siya kasi marami rin students kami na kakilala na gusto nilang mag-help pero they do not know kung paano mag-help kasi nga ang, ang sistema is iniisip nila or ang concept nila ay makakapag-donate ka lang or makakapag-help ka lang sa isang tao if malaki 'yung mabibigay mo, if kaya mo siyang pag-aralin for the whole sem, for the whole year kaya 'yung iba... through organizations din sila nagdo-donate and 'yon 'yung nangyayari between the organization, between Tulay Philippines and also doon sa mga nagd-donate sa amin and ayon... uh, agree ako, I mean bakit agree? I really understand 'yung ganitong setup and okay siya, very helpful siya sa mga uh organizations din na starting kasi isa sa uh... isa sa concern or isa sa difficulties ng mga small NGOs is 'yung makahanap ng student na mahe-help kasi mahirap... kahit papaano mahirap din maghanap ng student na deserving talaga na mabigyan."

Ms. Hannah Liquiran - TULAY Philippines (May 22, 2023)

TULAY PHILIPPINES FEEDBACK.mp4, 00:00 - 02:02

"Hi, I am Hannah Liquiran, the founder and the president of Tulay Philippines, a non-profit, non-governmental organization that provides educational assistance to the youth, with over 400 beneficiaries nationwide. We started this initiative last 2020, with the goal of making education possible and equitable for all. And since then, we've been working with various organization to achieve such goal of being of help to students in any possible means. And in this partnership, Isko ni Juan app had open another opportunity for small NGOs like us to make initiatives. And in terms of its functionalities we believe that it serves its purpose and intention for which it was made. It also doesn't require much of instructions

on how to use it. The features are simple, they are very consistent, and we find them unique. Especially how the app has a platform for students to create a campaign wherein it also gives us the chance to review it and see firsthand in which purpose the educational assistance will be used for. In addition, the user interface of the app is pleasing to the eye, it is easy to navigate. And with the help of our technical head in Tulay Philippines, we had confirmed that the machine learning algorithm used is appropriate. It had generated and helped the app with its features. And we also see that this application has a great MVP and has endless possibilities that will help not just Tulay Philippines but also other organizations and beneficiaries as well. We would also like to appreciate the developers in choosing mobile platform because it is accessible to the majority and if not all, to the users and beneficiaries. Lastly, we would like to thank the team for choosing Tulay Philippines to test Isko ni Juan app, and be part of the system. Thank you.”



2. Asher Remigio

Mr. Asher Remigio - Student of TUP Manila (May 22, 2023)

Asher_Remigio_Feedback.mp4, 00:09 - 0:59

“Sa Isko ni Juan kasi pwedeng bigyan ‘yung mga beneficiaries ng funds. So, gano’n ginawa ko. So, una nag-create lang ako ng campaign and luckily, na-pick ko do’n si Ms. Hannah Liquiran, a philanthropist from Tulay Philippines. So ‘yung Tulay Philippines tinulungan nila ‘kong ma-fund ‘yung thesis. So, with that, I am extremely grateful sa Tulay and then sa Isko ni Juan, especially sa developers nito. Kasi sa Isko ni Juan, hindi ka na mahihirapan maghanap ng scholarships sa iba’t ibang platforms. Nandito na, pwede silang mapunta lahat. And again, thank you Isko ni Juan, kasi tinulungan niyo ‘ko sa thesis ko, and stepping stone na rin ‘yon para ma-finish ko ‘yung degree ko. ‘Yun lang.”



3. Eric John Tangaro

Mr. Eric John Tangaro - Student of TUP Manila (May 22, 2023)

Eric_John_Tangaro_Feedback.mp4, 00:00 - 01:33

“I am Eric John Tangaro from TUP Manila, currently taking Computer Engineering and I’m one of the users of Isko ni Juan and this app is very helpful. Lalo na sa mga katulad ko na student and sa Isko ni Juan dito ako nakilalala uh... dito ako natulungan na makahanap ng funding para sa uh... training costs sa cybersecurity na dito ako nakilala through creating campaign uh... One of the benefactor na Tulay Philippines and si Ms. Hannah Liquiran and the app is super simple to use and lahat ng scholarship is makikita mo dito and then marami then na pwedeng ilagay or i-create na campaign which is very helpful para sa mga students and I’m thankful to Tulay Philippines and sa Isko ni Juan and thanks Hannah Liquiran for the opportunity na mag-grow ako sa career ko sa cybersecurity as a graduating student ng computer engineering.”



4. Marc Darelle Deguzman

Mr. Marc DarelleDeguzman - Student of AMA Fairview College (May 20, 2023)

Marc_Darelle_Deguzman_Feedback.mp4, 00:00 - 01:43

"Hi, everyone! Ako nga pala si Marc Darelle De Guzman, estudyante na nag-aaral sa AMA Fairview College na kumukuha ng kursong BSIT at kasalukuyang nasa second year college na. Gusto ko lang ipahayag ang taos pusong pagpapasalamat ko sa Isko ni Juan project at sa pagtulong sa akin at ako'y nabigyan ng tulong na kinakailangan kong kagamitan para sa aking eskuwelahan at ako ay isa sa masuwerte nilang napili sa projekto na ito. Salamat dahil sa kanila at ng iba pang mga benefactors ako ay nakakuha ng funds pambili ng flash drives na kakailanganin ko at ng mga classmate ko sa school para sa research namin. Nais ko din magpasalamat sa Tulay Philippines at kay Ms. Hannah Liquiran at sa iba pang benefactors at pinili nila akong bigyan ng tulong at naging Tulay nito ang Isko ni Juan sobrang laking tulong ng development ng app na 'to dahil napakaraming organization ang nakapaloob sa app na to at sila ay willing tumulong sa

mga estudyanteng gaya ko hindi lang para sa akin kundi para din sa mga estudyante may matinding pangangailangang pinansyal lalo na sa mga school projects sobrang ganda ng Isko ni Juan at sana ay lumawak pa ang ang mga nasasakupan nito at dumami pa ang tumangkilik sa app na ‘to dahil dito sa app na ‘to maraming willing, uhmm... ang maraming willing tumulong na mga different organization at taos puso akong nagpapasalamat sa inyo. Maraming salamat.”



5. Marlvin Justine Rances

Mr. Marlvin Justine Rances - Student of TUP Manila (May 20,2023)

Marlvin_Justine_Rances_Feedback.mp4, 00:00 - 01:08

"Hi, I'm Marlvin Justine Rances, a Bachelor of Science in Mechanical Engineering student at TUP, Manila. I am one of the users of the Isko ni Juan app. I would like to commend this application since it has the ability to give students a platform to create their own campaign to be funded and donated. Also sa app na 'to naka-sort na dito lahat ng scholarships na available dito sa Philippines so it's easier to access and browse them by the students na naghahanap ng scholarships. So as a user of this app, I made a campaign for our thesis since we are lacking in funds. Fortunately, I would like to thank Ms. Hannah from Tulay Philippines for their assistance on my campaign and this would be a great help for our thesis. So thank you so much again Ms. Hannah and also sa bumubuo ng application na 'to since sobrang helpful niya para sa mga students. Overall, uhm, the Isko ni Juan has a bright future and can help more students in terms of financial assistance and in finding scholarships that will help them in their academics."



6. Mrs. Mylene Sangines

Mrs. Mylene Sangines - OSA Administrator for Public Scholarships

OSA_Feedback.mp4, 13:39 - 14:20

"Ang kagandahan n'yan mapapakinabangan although mapapakinabangan naman 'yan ng estudyante kasi nga magakakaroon siya ng chance para mamili ng benefactor. Pero mas kay benefactor kasi maa-anong niya... ma-i-screen niya kaagad kung sino 'yung kaniyang pwedeng bigyan.. At saka syempre kung makikidirekta sila makiki-MOA pa sila sa TUP o sa university maraming etse buretse maraming proseso pero 'pag ka d'yan... oh sige, go na!"

Appendix F

THESIS GRAMMARIAN CERTIFICATION

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES	Index No.	REF-COS-3.5-INT-TGC
	Ayala Blvd., Ermita, Manila, 1000, Philippines Tel No. +632-5301-3001 local 608 Fax No. +632-8521-4063 Email: cos@tup.edu.ph Website: www.tup.edu.ph	Revision No.	00
VAA-COS	THESIS GRAMMARIAN CERTIFICATION	Effectivity Date	06132022
		Page	1 / 1

THESIS GRAMMARIAN CERTIFICATION

This is to certify that the thesis entitled,

**ISKO NI JUAN: MOBILIZING SMALL-SCALE PHILANTHROPY TO FINANCE
COLLEGE STUDENTS USING MACHINE LEARNING**

authored by

Bracamonte, Miguel Andrew S.
Cobilla, Ramil S. Jr.
Dichoso, Jhon Carlo P.
Miñon, Alexandre Benedict H.
Pascual, April Kate L.

has undergone editing and proofreading by the undersigned.

This Certification is being issued upon the request Miguel Andrew S. Bracamonte, Ramil S. Cobilla Jr., Jhon Carlo P. Dichoso, Alexandre Benedict H. Miñon, and April Kate L. Pascual for whatever purposes it may serve them.

Marilyn M. Ignacio
Prof. Marilyn M. Ignacio
Grammariam

Technological University of the Philippines

June 12, 2023

Date of Issuance

Transaction ID	
Signature	

Appendix G

CERTIFICATE OF SIMILARITY INDEX USING TURNITIN FROM URDS

 TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES Ayala Blvd., Ermita, Manila, 1000, Philippines Tel No. +632-5301-3001 local 711 Fax No. +632-521-4063 Email: urds@tup.edu.ph Website: www.tup.edu.ph	Index No. REF-URD-INT-CSI Issue No. 01 Revision No. 01 Date 04132021 Page 1 / 1 QAC No. CC-04132021
VRE-URD	CERTIFICATE OF SIMILARITY INDEX USING TURNITIN

This is to certify that the manuscript entitled

"ISKO NI JUAN: MOBILIZING SMALL-SCALE PHILANTHROPY TO FINANCE COLLEGE STUDENTS USING MACHINE LEARNING"

authored by

MIGUEL ANDREW S. BRACAMONTE
RAMIL S. COBILLA JR.
JHON CARLO P. DICHOSO
ALEXANDRE BENEDICT H. MINON
APRIL KATE L. PASCUAL

has been subjected to similarity check on June 15, 2023
using Turnitin with generated similarity index of 10%

Processed by:


DR. MICHAEL ALLAN A. BAHTAJI
Faculty, URDS

Certified correct by:


DR. FRANCISCO D. ESPONILLA II
Director, URDS

Transaction ID	REF-URD-INT-CSI-03282023-1119AM
Signature	

Appendix H

CERTIFICATE OF SIMILARITY INDEX USING TURNITIN



Similarity Report ID: oid:25992:37585146

PAPER NAME

ISKO NI JUAN

WORD COUNT

35217 Words

CHARACTER COUNT

210093 Characters

PAGE COUNT

246 Pages

FILE SIZE

28.2MB

SUBMISSION DATE

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**PERSONAL INFORMATION**

Age: 22
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Birthday: May 3, 2001
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Citizenship: Filipino

KNOWLEDGE AND SKILLS

- Knowledgeable in C, Python, Java, React Native, HTML, CSS, Javascript.
- Knowledgeable in Data Science, Web Development, and Mobile Application Development.

ACCOMPLISHED PROJECTS

- **Four Legged (Web Project)**
Back End Developer
Jun 2022-July 2022

EDUCATIONAL ATTAINMENT

Tertiary: Technological University of The Philippines
Ayala Blvd, Ermita, Manila
Bachelor of Science in Computer Science

Secondary: Arellano University (Apolinario Mabini Campus)
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2017-2019

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Don Bosco, El Dorado, Parañaque
2013-2017

Primary: Sun Valley Elementary School
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2007-2013

RAMIL S. COBILLA JR.

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0966-271-2988

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PERSONAL INFORMATION

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Sex: Male
Birthday: December 20, 2000
Civil Status: Single
Citizenship: Filipino

KNOWLEDGE AND SKILLS

- Knowledgeable in C, C#, Javascript, Python, Flask, SQL, React Js, React Native, Astro, TRPC and GraphQL
- Knowledgeable in Web Development, Machine Learning, Data Science, and Mobile Development

ACCOMPLISHED PROJECTS

- Poetry Generator (Web Project)
Lead Developer & Machine Learning Engineer
April 2022- May 2022
- Sixth Sense (Web Project)
Lead Developer & Machine Learning Engineer
June 2022 - July 2022

EDUCATIONAL ATTAINMENT

Tertiary: Technological University of The Philippines
Ayala Blvd, Ermita, Manila
Bachelor of Science in Computer Science

Secondary: STI College Muñoz
Congressional Ave., Munoz, Quezon City
2017 - 2019

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2013 – 2017

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2007 – 2013

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PERSONAL INFORMATION

Age: 21
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Citizenship: Filipino

KNOWLEDGE AND SKILLS

- Knowledgeable in C, Python, Java, MySQL, React Native, HTML, CSS, Javascript, PHP, GraphQL, and Flask.
- Knowledgeable in Machine Learning, Data Science, Web Development, and Mobile Application Development.

ACCOMPLISHED PROJECTS

- **Poetry Generator (Web Project)**
Lead Developer & Machine Learning Engineer
April 2021- May 2021
- **Sixth Sense (Web Project)**
Lead Developer & Machine Learning Engineer
June 2021 - July 2021

EDUCATIONAL ATTAINMENT

Tertiary: Technological University of The Philippines
Ayala Blvd, Ermita, Manila
Bachelor of Science in Computer Science

Secondary: Caloocan City Business High School
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2013-2019

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PERSONAL INFORMATION

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Citizenship: Filipino

KNOWLEDGE AND SKILLS

- Knowledgeable in C, C++, Python, Java, JavaScript, MySQL, MongoDB, React Native, HTML, CSS, and PHP.
- Knowledgeable in Web Development, Data Science, Mobile Application Development, and UI/UX Design.

ACCOMPLISHED PROJECTS

- **Online Freelancing Services (Web Project)**
Back End Developer and QA tester
January 2022-March 2022
- **Poetry Generator (Web Project)**
Front End Developer
April 2021- May 2021

EDUCATIONAL ATTAINMENT

Tertiary: Technological University of The Philippines
Ayala Blvd, Ermita, Manila
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PERSONAL INFORMATION

Age: 22
Sex: Female
Birthday: April 23, 2001
Civil Status: Single
Citizenship: Filipino

KNOWLEDGE AND SKILLS

- Knowledgeable in C, C++, HTML, CSS, JavaScript, Python, Java, MySQL, MongoDB, React Native, Flask, and Flutter.
- Knowledgeable in Web Development, Mobile Application Development, Data Science, UI/UX Design, and Quality Assurance (QA) Testing.

ACCOMPLISHED PROJECTS

- Meals for Makers (Web Project)**
Front End Developer & QA Tester
January 2022-March 2022
- Poetry Generator (Web Project)**
UI/UX Designer & Front End Developer
April 2022- May 2022

EDUCATIONAL ATTAINMENT

Tertiary: Technological University of The Philippines
Ayala Blvd, Ermita, Manila
Bachelor of Science in Computer Science

Secondary: STI College Carmona
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2017-2019

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2013-2017

Primary: Cabilang Baybay Elementary School
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2007-2013

